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ABSTRACT

Intended to assist Agency for International Development (AID) officers, advisors, and health officials in incorporating health planning into national plans for economic development, this third of ten manuals in the International Health Planning Methods Series deals with health manpower planning and assessment. It provides a conceptual and methodological framework useful as an analytic model for the development and utilization of health personnel. Special attention is given to the use of medical assistants and auxiliaries to provide primary health care in rural areas where it is difficult to attract or maintain full-time physicians. Chapter 1 gives an overview of considerations in health manpower. Chapters 2-3 discuss the organization and use of the assessment model, including input data and indicators and assessment instruments (data collection). The analysis component, the core of the model, and outputs are considered in chapter 4. Appendixes in chapter 5, amounting to almost one-half of the manual, include (1) information on data and indicators needed for the assessment model, (2) methodology for determining health personnel needs, (3) sampling procedures and training institution survey, and (4) an extensive bibliography. (A supporting document in the International Health Reference Series containing a literature review and annotated bibliography is available separately as CE 024 225.) (YLB)

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International Health Planning Methods Series

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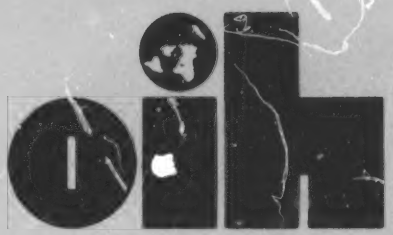
Health Manpower Planning



Guidelines for Analysis of Health Manpower Planning

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Guidelines for Analysis of Health Manpower Planning

U.S. Department of Health, Education, and Welfare
Public Health Service
Office of the Assistant Secretary for Health
Office of International Health

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PREFACE TO THE SERIES

The International Health Planning Methods Series has been developed by the Office of International Health, Public Health Service, on request of the Agency for International Development.

The series consists of ten basic volumes, which cover a variety of health issues considered vital for effective development planning. These volumes are supplemented by additional works in the International Health Reference Series, which list resource and reference material in the same subject areas.

The International Health Planning Methods Series is intended to assist health sector advisors, administrators and planners in countries where the Agency for International Development supports health related activities. Each manual attempts to be both a practical tool and a source book in a specialized area of concern. Specific methods for collecting information and using it in the planning process are included in each manual.

The supporting documents in the International Health Reference Series contain reports of literature surveys and bibliographies in selected subject areas. These are intended for the serious researcher and are less appropriate for broad field distribution.

The volumes in the International Health Planning Methods Series contain the collective effort of dozens of experienced professionals who have contributed knowledge, research and organizational skills. Through this effort they hope to provide the AID field officer and his host country counterparts with a systematic approach to health planning in developing countries.

PREFACE TO VOLUME THREE

This manual deals with the subject of health manpower planning in developing countries. It is the third volume in a series of works known collectively as the International Health Planning Methods Series.

The series was produced by the Office of International Health as requested by the Agency for International Development to provide AID advisors and national health officials in developing countries with critically needed guidelines for incorporating health planning into national plans for economic development.

Generally, an assessment model for health personnel planning in undeveloped countries is not available. Health sector analyses performed by donor nations in foreign aid programs also lack methodological consistency. This assessment manual, therefore, is offered as a tool for performing health personnel planning. It provides a conceptual and methodological framework for use by the analyst and policy planner for the development and utilization of health personnel.

Preparation of this volume was undertaken for the Office of International Health by the E.H. White & Co., Management Consultants, San Francisco, California. Primary authors of this manual were Robert J. Staff and Dennis R. Porter. Substantial editing and revision was performed by Sheldon Miller.

The emphasis in this manual has been placed on developing a conceptual framework that is useful as an analytical model under varying circumstances, rather than describing any single existing system in detail. Health manpower planning is a difficult task, affected by numerous variables. It is also a relatively long range task, since the health manpower supplies of the future must be developed through training and educational opportunities years before new practitioners become active in the field.

Within this manual special attention has been drawn to the use of medical assistants and auxiliaries to provide primary health care in rural areas where it is difficult to attract or maintain full time physicians. Various methods for planning for utilization of these health personnel are discussed.

It should be emphasized that the present work makes no claim to being comprehensive in the field of health manpower planning. Constraints of time and funding have made a degree of selection, and regrettable omission, unavoidable. Additional works in this field have been noted in Reference Series Volume 3:Literature Review and Annotated Bibliography for Health Manpower Planning.

The authors of this manual have frequently expressed personal points of view with reference to specific health manpower planning practices. While their viewpoints generally coincide with organizations or agencies with whom they are associated, the material in this text should not be construed to reflect the official policy of any agency or organization.

Paul I. Ahmed
Project Officer
Office of International Health

ACKNOWLEDGMENTS

Each volume in the International Health Planning Methods Series has been the work of many people. In addition to the primary authors, each manual has involved government reviewers and reviewers from positions outside government, editors, revisors, and numerous technical and support personnel. Substantial contributions have been made by manual advisors who provided the authors with the benefit of their knowledge and experience in the fields under study.

With reference to Volume 3: Health Manpower Planning, special thanks are in order for contributions made by the following persons: Professor Oscar Gish, University of Michigan; Dr. Thomas L. Hall, University of North Carolina; and Dr. L.F. Krystynak, senior health manpower analyst at the White House, Washington, D.C.

Gratitude is acknowledged to Dr. William Tash and Sheldon Miller, who substantially revised the original text.

Acknowledgments are also due to Irv Taylor, Karen Cox, Scott Lumas, and Vic Wehmann.

While the present work could not have been completed without the assistance of these individuals, responsibility for the content of this manual rests solely with the authors.

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CHAPTER ONE

CONSIDERATIONS IN HEALTH MANPOWER

The importance of this manual lies in the fact that often more than 50% of the funds allocated for health systems in many less developed countries are allocated for personnel (labor) costs. The utilization of these funds for personnel profoundly affects the nature of the health care system and particularly the state of health for the residents of a country.

While there may be disagreement about some of the following observations, they do appear to be the basis of the Western-oriented approach to health personnel planning.

National Development: There is a move away from development as measured in terms of Gross National Product and strictly economic indicators towards the use of social indicators. Such indications include improved nutrition, employability, personal productivity, education, personal and social health, and the redistribution of the national resources, with more attention directed to better development of the human resources.

The Health Sector: The health sector comprises community water systems and supplies, sanitation activities, nutrition, community development and environmental engineering, as well as integrated (preventive and curative) health delivery systems.

Major Health Advances: Major health advances in the industrialized countries came largely as a result of improved water supplies, sanitation, hygiene, nutrition, housing, and education. Various public and private policies reaching far beyond those pertaining directly to the health sector have contributed to these advances.

Resources Available for Health Planning: Major differences may be found between the goals and objectives of formal health plans and the resources available to achieve them. Approximately 8% of the Gross National Product in the United States, for example, is spent for health service. This is comparable to health expenditures in other industrialized nations during the 1970s.

Resource Allocation for Health Projects: Due to the overlapping nature of the causes and effects of poor personal and social health, it is very difficult to allocate priorities among health goals and objectives. The problems and services should not be described in two dimensional charts and diagrams, but rather they should be viewed as a web of interacting subsystems. The subsystems are beginning to be defined by their interrelations and interchanges. This makes the political and organizational variables central to the allocative decisions or systems being planned.

Developing Health Personnel: Historically, decisions related to health personnel development and deployment have been made by medical doctors. This has led to a medical view of personnel development, hierarchial in nature and largely treatment oriented. The development of disease prevention programs and public health activities, however, may prove more cost effective in improving community health when compared with the development of specialized treatment personnel.

Goals of Health Planning: The basic question any analyst must ask in examining objectives, plans, and programs is "Whose needs are being served?" The goals of health planning must be directed to the overall good of citizens.While the goals of health sector planning are myriad, there are many common goals which require a

broad strategic and personnel development approach if they are to succeed.

Competing Health Program Objectives: There are a number of intervention activities which compete for scarce health resources. These include the following:

- Programs to assist the most people or largest problems, e.g., disease control, access to primary care (versus those designed for specific target populations).
- Programs designed to reach those easiest to serve (as opposed to those directed at the least accessible).
- Programs designed for the quickest results, e.g., disease control, environmental controls (versus those aimed at long term care regimes and solutions).
- Programs aimed at serving the least acce-sible, e.g., racial or ethnic minorities or remote villages.
- Programs aimed at those with the most socio-economic potential, e.g., middle class, civil servants, workers, students (versus those dealing with the most disadvantaged).
- Programs which serve those with major social responsibilities, e.g., military, heads of households, community leaders & students.
- Programs which require the longest sequence of projects/activities, e.g., integrated national or regional health delivery systems.
- Programs which stimulate self help and decentralized leadership, e.g., prevention and disease control.
- Programs which prepare decision makers to accept changes in resource allocation, e.g., planning programs, experimental and demonstration programs.

These objectives frequently operate side by side. They can also create organizational tensions when competing for limited human resources as well as capital.

Health Planning Approaches: The classic approach assumes a rationality of decision making. It adapts methods, strategies and content in planning to yield more rational public policies. This approach has been questioned by Western planning theorists primarily because of the inherent limitations to planning and evaluating goals and values. The multi-variate nature of cause/effect relationships limits informed comprehensive planning. In turn, issues have led to variations in planning strategies. They include:

a) Probabilistic Programming. This strategy recognizes an incremental and multi-centered decision making process which seeks to expand the probabilities that decisions will be made more rationally. The use of major information systems is advocated to provide better knowledge as well as an improved basis for making predictions.

b) Informal Coordinator-Catalyst. This strategy places the planner in the crossfire of conflicting public issues. It seeks to work out compromises and informed judgments.

c) Disjointed Incrementalism. This strategy is limited to comprehensive planning. It encourages the development of segmental and incremental policy recommendations. Analysis in this approach will be partial and aimed at specific problems. Vague externalities and spillover effects are not examined. Solutions are rarely long range or comprehensive.

d) Advocacy and Plural Planning. This strategy assumes tension between personal convictions and supposedly value free professionalism. Since few public decisions are free from value laden decisions, it is assumed that planners are acting partially from their own convictions. This strategy suggests that planners work with community groups, the poor, residents in rural areas, and neighborhood workers in order to address health problems affecting these groups.

e) Adaptive Planning is a major alternative to developmental planning. Adaptive planning is interested in qualitative adaptations. It responds to the forces and pressures of society. On the other hand, developmental planning seeks to generate unused levels of resource investment. This manual examines planning decisions which are developmental.

Health Personnel Planning: Health personnel planning evolves from major components, such as:

a) Policy Linkages. The national health personnel development objectives and policies must fit within the overall human resource development policies.

b) Target Populations. The scarcity of capital, as well as human and knowledge resources, in some less developed countries makes planning for target populations or areas a major resource allocation consideration. Such targets are disease patterns, areas with high infant mortality, areas with low productivity, and areas with heigh morbidity or mortality rates.

c) Scope of Health Personnel. The full range of associated health personnel, including the traditional healer and curer, practical or untrained midwife, herbalist, community health worker, community development worker and environmental health worker, should be included in the stock of the health personnel. Though sometimes not recognized within the medical hierarchy, indigenous health personnel may be quite influential on a sociopolitical scale.

d) Bases for Personnel Supply and Demand. The creation and examination of personnel supply and demand can be based on measures other than ratios of pupulation growth and health worker tc the population. It is more realistic to measure the creation and supply of personnel against objectives, programs, incidence and disease statistics, and facilities rather than against population.

Health Personnel Upgrading: An important element is the upgrading and provisions for continuing education of all levels of health personnel. The nature and location of upgrading institutions is another important assessment element. Absence of formal systems to upgrade allied and auxiliary health personnel may be detrimental to good planning.

Community Participation: When there is a means to formulate health care demands, community participation is a major force in decision making. Health agencies should actively solicit a broad spectrum of consumers for membership on health advisory boards to assure community involvement.

Major Public Policy Issues in Health Manpower Planning

Many considerations need to be taken into account in the development of plans and analyses. The present discussion focuses on the core political aspects of those considerations. The following issues reflect key public policy questions which should be examined either in performing an assessment of health personnel or in planning for their utilization.

1) How are health manpower resources being distributed within the country? Equity considerations require that special attention be paid to the allocation of health personnel within a country. Useful measures of allocation are based upon neonatal mortality rate, manpower assessment by catchment area, planning district, or geographical boundary. Alternatives to these measures are based upon analyses of personnel allocations to target populations or target problems, e.g., disease patterns. The extreme scarcity of health resources in many less developed countries suggests that the policies and strategies will have the greatest impact in terms of equity, efficiency, and effectiveness. This is done by distributing personnel equitably among target populations and decentralizing personnel utilization through an increase in personnel assigned to rural regions.

2) How well is health manpower planning integrated with other national planning? The development of primary health care occurs within the context of national development planning goals and strategies. It is necessary that planning and analysis of health personnel recruitment, training, and utilization occur within the wider development context. The planner and analyst should understand the strategies being applied to national planning. Three suggested measures of national development, other than gross national product, are: improved nutritional status,; changes in the unemployment rate; income redistribution, e.g., suggesting more equality between groups and social classes within the country.

All three measures are applicable to resources allocated to health personnel development and utilization. The integration of health planning into an overall national planning model requires special analysis. It is important to consider steps to be taken in order to improve the integration, although such steps may go beyond the scope of this manual.

3) How are auxiliary and indigenous health personnel being utilized in primary health care and disease prevention? The poor are normally underserved by primary health care resources. The amenities to attract skilled medical personnel are lacking. Funds are limited for salaries. Lack of mobility and the absence of professional stimulation are some of the main reasons why rural areas are unable to attract and retain professional health personnel. An alternative is the effective use of nonprofessional personnel with appropriate support and supervision. Another alternative is the integration of traditional healing personnel (traditional healers, shamans, curandeiros) into the health system. Since the most widespread causes of mortailty and morbidity are often related to communicable disease, environmental health, and nutrition concerns, the need for heavily professional staffing of preventive and primary health care delivery systems is neither imperative or possible.

4) What role does the local community play in defining primary health care needs, health personnel utilization and public health intervention strategies? It is essential that planning and assessment provide for ample local participation in problem analyses and problem solutions. The time has long since passed when planners in the national capital should unilaterally determine what is appropriate for a particular community or service area. Those engaged in health personnel assessments or planning should take steps to insure that a proper role for the community is provided in the analysis and decision making.

In examining the nature of local community involvement in decision making, two analytic approaches are suggested. The first is the normative approach, where the quality of participation is examined. The second is a behavioral one, where the context and the location of community participation is examined in the action sequence. Both of these approaches, which are subject to cultural and sociopolitical environments, are equally preferred. The decentralization of planning decisions and the involvement of the target community, however, are prerequisites for adequate analysis and planning.

Definition of Health Personnel

Though the field of health planning has long recognized trained manpower as the health sector's most important resource, often the training is not directly related to specific service needs. Several factors contribute to this problem, especially the difficulty of determining adequate definitions for various levels of health personnel. This lack of clearcut personnel definitions may result in fragmentation and scarce resources may be duplicated. The wise investment of these resources requires good planning which, in turn, begins with clear definitions. In the following section, this problem is examined and suggestions for a working set of definitions is given.

Parameters of the Problem: There is little or no agreement concerning the terminology used in the field of health manpower planning. To reduce this problem some definitions are proposed. Both health manpower and health personnel are used interchangeably, the latter term being an effort to lessen the masculine dominance of terminology in a field heavily comprised of workers from both sexes. Further, health personnel will include both those working in health service occupations and those being trained on-the-job for such occupations. It will also include those

who may be receiving formal education or training that might enable them upon completion to join one of the health professions.

The problems in defining health personnel expend when trying to categorize these workers by function and skill levels. In this effort the key principle is that health personnel groupings should be planned from the beginning so that they are clearly discrete with regard to functions, skills, or job responsibilities. Such clarification should also provide for clearcut upward mobility. In this way personnel at lower levels may advance through increased job experiences and additional training.

Task Analyses: The literature in the field almost universally divides the personnel pool into three sections, namely: professional, paramedical, and auxiliary levels based upon skill level, training and education. For the purposes of this manual, professional, technician, and auxiliary are preferred, as will be explained. Each succeedingly lower level is supervised by an individual in the group above.

The overall purpose of health manpower planning is to plan for appropriate levels of all health personnel. The approach used here widens the categories for the purposes of planning, and includes all personnel who have degrees from professional or allied health profession schools, or those who have graduated secondary schools and subsequently satisfied the requirements for completing accredited courses (lab, X-ray technicians, etc) that do not lead to a degree.

Attracting and holding competent persons for rural services is a severe manpower problem all over the world; therefore, providing for upward mobility in personnel planning is essential. The paradigm recognizes the need to plan for role changing among personnel in order to forestall the problems of the "closed career". Without the chance for advancement in the health system, the worker with a closed career has little choice. He or she either moves out of the field or, more frequently, remains locked in position. Flexibility is the key to preventing this problem, and simplicity is the key to flexibility. Health personnel structures which are overly hierarchical inhibit this type of flexibility.

Different countries have their own unique understanding of the task roles for each category of personnel. The purpose here is to offer a variety of roles and categories from which the health manpower planner may choose, based upon prevailing conditions. Once again, flexibility in this regard is the key. The ability of the planner to adapt a system to widely varying health environments will be the measure of that planner's success, e.g., of his/her ability to predict the supply, demand, and other characteristics of thos environments.

Definitions by Skill Level: The skill axis on the health personnel matrix developed for this manual isolates the only three traditional levels: professional, technician, and auxiliary. These introductory pages provide brief comments below on indigenous and support personnel as well.

a) Professional Level. Professional personnel include staff from various functional groupings. As noted earlier, these personnel are workers who have graduated from a professional, post-secondary school or a degree course. This listing separates some medical specialist categories,from groupings that are strictly "medical care" to those that are "family health care" or"allied health care". This has been suggested in order to isolate professional level workers for each of the five functional areas. It is based upon the category most appropriately representing the bulk of their professional efforts. For example, a pediatrician is a medical specialist and should generally appear under the medical care rubric, but it appears here under the family care grouping since it is assumed that the type of care offered is more appropriately family or parent oriented rather than general medical care. In some cases, these distinctions are arbitrary, but their usefulness will become apparent later.

HEALTH PERSONNEL

Categories suggested are shown by function and skill level.

SKILL/FUNCTION	MEDICAL CARE	NURSING CARE	FAMILY HEALTH	ALLIED HEALTH SERVICES	PUBLIC HEALTH
Professional (graduation from a course granting professional degree)	Physician (MD) Specialists: surgeon pathologist psychiatrist orthopedist anesthesiologist radiologist	Nurse (RN) Degree Nurse Public Health Nurse Psychiatric Nurse	Obstetrician Gynecologist Registered midwife Nurse-midwife	Administrator Dentist Dietitian Nutritionist Pharmacist Optometrist Optician Pharmacologist	Sanitary Engineer Health Inspector Health Officer (MD) Educator Biostatistician
Technician (secondary school plus two years training)	Physician Asst. Feldsher (USSR) Licentiate (Pakistan) Behdar (Iran) Medical Asst. (Pacific;Africa) Clinical Officer Surgical Tech. Lab Tech. Psychiatric Tech.	Diploma Nurse Practical Nurse (licensed) Asst.Registered Nurse Enrolled Nurse Enrolled Psych. Nurse Practical Nurse	Enrolled Midwife Child Health Technician Asst. Midwife Middle Level Workers Practical Midwife	Dental Hygienist Dental Lab Tech. Vision Therapist Pharmacy Asst. Pharmaceutical Asst.	Sanitarian Malaria Officers Health Educator Health Visitor
Auxiliary (elementary or middle school plus one year training, usually on-the-job)	Medical Corpsman Village Health Worker Technical Asst. Physiotherapist Auxiliary Barefoot Doctor Dresser First Aid Man Junior Health Worker Laboratory Asst. Health Promoter	Auxiliary Nurse Community Nurse Enrolled Community Nurse Ward Helper Health Visitor Nurse's Aide Practical Nurse	Aux. Nurse Midwife Child Health Associate Village Health Worker District Midwife Village Midwife Trained Dai Auxiliary Midwife Home Health Aide	Dental Asst. Enrolled Nutritionist Dental Secretary Hospital Support Dispenser Compounder Dental Aide Pharmacy Aide	Health Assistant Sanitary Inspector Public Health Auxiliaries Malaria Sprayer Vaccination Worker Leprosy Officer Tuberculosis Visitor Sleeping Sickness Officer Malaria Assistant

b) Technician Level. Those health workers with secondary school educations and two or more years training in their respective fields are designated as technicians. This category corresponds to paramedical in other schemata. Every country has its own categorizations of health technicians, though they may not replicate the breakdowns provided in this manual. A simplified stratification of skill and function levels is needed so that useful planning can take place. The names of workers suggested in these categories were identified from the health manpower planning literature.

c) Auxiliary Level. The auxiliary level includes workers with elementary or middle school educations, as well as a technical education with limited breadth, duration and depth. Sub-categorizations have not been attempted since they usually are country-specific distinctions.

d) Indigenous Practitioners. Indigenous health practitioners other than those listed above have not been treated in this manual, though it is recognized that they play a significant role in the overall health manpower picture. Another manual in this series, however, is devoted entirely to private and indigenous health practitioners.

e) Support Personnel. Several other groupings of health-related workers have been omitted from this manual. These include various support personnel which usually come under generalized manpower planning.

Definition by Function Level: Another health personnel dimension relates to functional areas. The schema suggested includes five basic functional areas: medical care, nursing care, family health, allied health services, public health. The paradigm is designed to show relationships among certain primary care personnel and selected ancillary service providers. Depending upon the local application of this process, planners may prefer other functional divisions, such as primary, secondary, tertiary; curative, preventive, emergency; or hospital inpatient, primary public health. The present schema will very likely prompt development of categories other than those suggested, from which appropriate local functional divisions may be utilized.

CHAPTER TWO

ORGANIZATION OF THE MODEL

A system is defined as a complex of interconnected elements. The systems approach to analysis, advocated here for the purpose of assessment of health personnel planning, is based on the assumption that there are interconnections among the various related problems. These are addressed by allocating human, financial, and knowledge resources needed to resolve them. The systems approach provides an organized way to look at health problems and to describe or model solutions in an ordered fashion. Under this approach, planning and assessment are viewed as management functions performed at various stages in an ongoing resource allocation process. Thus, they are different aspects of a common management responsibility.

The use of this approach assumes that the overall system (or set of procedures along with human, capital, and knowledge resources which are used to provide health related personnel) has an affect on other parts of the health care delivery system. In order to utilize or evaluate any decision or action regarding the health personnel system, it is necessary to identify the significant interactions. The systems approach to the assessment of health personnel planning, consequently, includes data collection relative to external or environmental variables which have impact on health personnel assessment and planning. This approach is oriented toward results. The calculations, assumptions, data and judgments made are explicit and are subject to validation.

The propositions and hypotheses underlying this approach depend less on personalities, reputations or vested interests than those of other, less formal approaches. At the same time, the need to understand the dynamics and personalities of involved leading health authorities, as well as the concerned public, is an essential part of a sound systems analysis of health personnel planning. Also crucial is a subjective appreciation of reasoned judgment. Still, the judgments will not be entirely value free.

The advantage of the systems approach in the assessment of health personnel plannning is that the organization of the assessment is clearly defined; and although environment-specific in results, it is universal in application. The systems approach is dynamic and may be adapted to a wide variety of situations. The application of the systems methodology may be simple or complex, manual or automated. It forms the basis for a management information system which is a normal prerequisite for not only defining needs, but also planning to meet the identified needs. It sets objectives, implements strategies, and assesses impact.

A primary difficulty in most assessments is obtaining data on the outcomes or outputs of a particular process, system, or program. The systems approach emphasizes defining outcomes which may result from specific inputs; furthermore, it suggests measures where alternative inputs can be examined with a view to achieving different outputs. This approach to analysis is output oriented.

The systems procedure set forth in the following section provides the elements of analytic design which may be applied to various country-specific situations. Though it may be modified, such modification may be based upon the nature of the available data and organizational configurations applicable to a given country. Furthermore, it is possible for national and international politics and developmental exonomics to significantly shape the nature of the system.

The analytic design may also serve as the basis for the development of a planning information system. With slight modification, it may serve as the basis for performing detailed policy analyses. It is especially appropriate for analyses which examine alternative costs and benefits. The model prescribes the data base which may be requested by an outside assessment team prior to arrival in a country. An advance team can, consequently, initiate preliminary data collection, as well as organize the work program, prior to the actual start of the field work.

Key Questions Addressed by the Analytic Design

The systems analysis model addresses six primary questions:
- What are all the objectives of the current health personnel planning system?
- What are the existing and near future conditions under which these objectives are to be achieved?
- What are the characteristics of the remediable problems?
- What is the nature and sequence of the various decisions which were made in the health personnel planning process?
- What are the most appropriate actions, taking into consideration all possible factors?
- What action agents can best carry out these actions (e.g., programs, strategies, projects, reforms)?

Churchman has identified five basic considerations needed when thinking about systems. They pertain to:
- the total system objectives and performance measures,
- the system's environment, specifically the fixed constraints,
- the resources available to the system,
- the various components of the system, such as goals, activities, and measures of performance,
- the management of the system.

In its basic form the system has six sections: the data base, instruments, operations and sub-operations, analyses, outputs, and feedback sections.

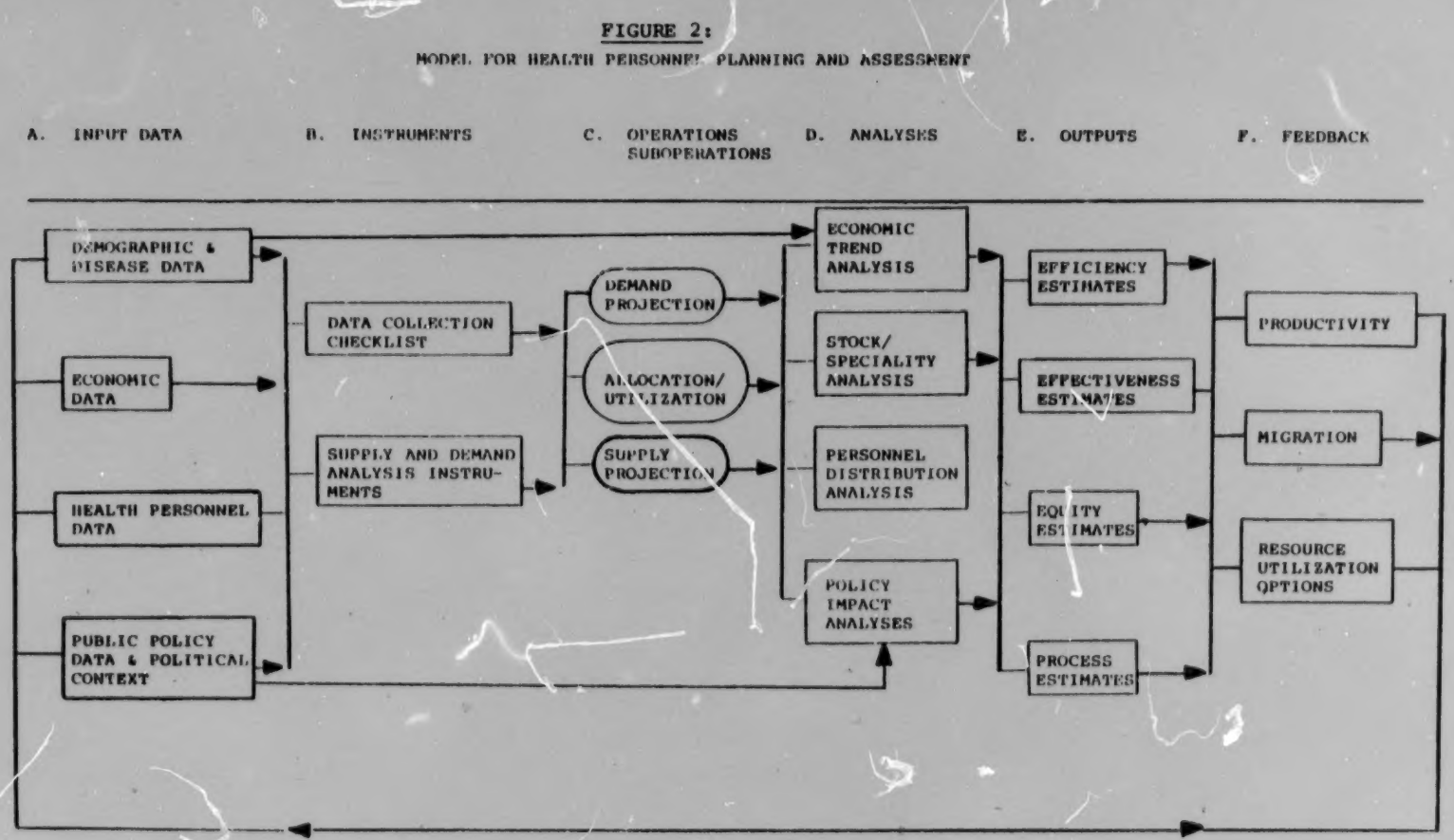
The responsibility of the analyst or assessment team is to gather the appropriate data, guide the analysis process, determine the analysis outputs, and then show how the planning system works in a particular country. As described here, the analytic design performs two functions. It describes how the current planning and operations system works, and it forms a framework for making analytic judgments about how it is working.

The importance of the descriptive aspects of this system is that the analyst can model the data base, and decision processes which appears to be at work in the subject country. At the same time, the analyst or assessment team can gather crucial data and perform simple analytic manipulations to assess the outcomes of the particular system under analysis.

This analytic design assumes that policy making and the conflict for limited resources is essentially normative. It does not impose objectives or decisions on the host country. It does specify an analytic perspective which may not be currently in use by national health planners and administrators.

FIGURE 2:

MODEL FOR HEALTH PERSONNEL PLANNING AND ASSESSMENT



CHAPTER THREE

THE ASSESSMENT MODEL

The preceding diagram outlines the basic model for health personnel planning and assessment. Since any model is an approximation of reality, it does not represent all the major factors related to health personnel assessment and planning. When experience and circumstances indicate, specific elements should be added to the model. For most cases, this model may contain too much information. Again, experience and circumstances should provide the basis for application of the key parts. The use of no more than five associated variables in any data category seems a reasonable approach for applying this model. This rule holds that only those key variables contributing most to the analysis are essential.

There are two classes of data sources specified by this model. When one class of information cannot be collected, the other should be substituted. Extant information is information currently available from existing sources. This includes statistical, narrative, organizational and impressionistic data available from in-country or out-of-country sources. The reliance on this information for most parts of the data base is preferred.

Original information is information which is derived from part of the health sector assessment, including special surveys and census, special empirical studies, normative and expert assessments on aspects of health personnel planning. The model should be developed within the context of on-going data needs so that the original data can become a regular part of the assessment system, e.g., surveys, expert and normative inputs to planning.

The assessment model is comprises of descriptions of how the planning and programming system functions. These descriptions relate to the manner in which planning and programming decisions are made, as well as the nature of the operations and sub-operations of the system.

The bulk of the assessment model is comprised of collection, analysis, and manipulation of information. This data then enables the analyst to assess the planning and programming affecting various sectors of the country. Data used for an external assessment may not necessarily be used in the internal planning and decision making of the country being assessed.

For example, if the health personnel planning assessment is performed as a study with special resource allocations and status, it is likely that some of the data collection and analysis will not be recurrent. The expectation is, however, that the model can be utilized for regular, ongoing health personnel planning by a particular Ministry of Health. If this is the case, model utilization takes the form of an information system specifying inputs, analyses, and outputs.

Input Data and Indicators

Health manpower planning should be a dynamic process. It should provide the amount and type of knowledge and skill needed by health personnel to produce changes and to make the health care system more responsive to a population's needs. When well done, the health personnel planning process will show the types and numbers of health workers that will be required to perform specific kinds of services within the country for designated population groups.

In order to arrive at this objective, the planning process facilitates analysis of prevailing -- and projection of future -- health needs and social demand, as well as manpower availability and requirements. The process then enables adjustments to be made for any imbalances among these elements. This is extremely important in developing nations, where it is estimated that only on-third or less of those who are born live to maturity. The health planning process generally follows the same pattern of planning that is used in other policy evolving sciences. Initially, situational analysis is conducted. This is followed by the formulation of various tactical alternatives. An analysis is then made of critical decisions, prior to implementation of the plan that is selected. Finally, there is an evaluation made of the results of the effort.

Perhaps the most important step in the entire process is the situational (political) analysis. This analysis depends upon data. (The better the data, the better the analysis.) The data generated for the health personnel planning process are of several basic groupings. These data relate to the broad areas of demographic studies and disease, economics, health personnel, and health policy within the political context.

Assessment Instruments

The nature of the data collected differs, naturally, from country to country While some data are collected but not readily available, others are not part of the data base, neither of the national development planning program nor the Ministry of Health. The analyst must, therefore, have alternative methodologies, given the amount of time available to perform the assessment or to do the planning. A review of the data base and the nature of one's statistical reporting should definitely be examined in light of more comprehensive data reporting needs.

The following chart suggests the possible sources of data for the proposed input information. While serving as a guide, this checklist will not stubstitute for the actual knowledge about the statistical analysis and decision making configurations in a given country. In developing a work plan from this checklist, the analyst or planner may wish to give a rating (i.e., 1-3) based upon the value of the data source used. The listing provides ready reference to keep track of input data collection and the data sources by category.

Once sufficient attention has been given to the selection of various data sources, the planner can then turn to supply analysis. The suggested definition of certain personnel categories is discussed, along with the process of identification of the variables to be analyzed, the selection of data sources, and various data collection methods as they specifically apply to the process of supply analysis.

Supply analyses start with both the identification and definition of personnel categories. This is a highly individual problem for each country. The overall cost of personnel utilization and the ability of the integrated health services delivery system to cover as much of the pupulation as possible are the most important factors to be considered.

Personnel categories should be chosen which are important to the overall manpower structure of the health sector and about which something can be accomplished. Problems arise in data collection, accuracy and utility if the number is too high. (Less than 15 is preferable.) From the almost 100 skill-function groupings conveyed in the occupational titles listed earlier, the planner should choose less than one fifth to actually analyze. Which ones are chosen is a matter of local understanding, terminology, and preference.

The planner would do well to establish priorities among the various types of information needed for each of their personnel categories. This recognized the scarcity of the planner's time and the limited funds available for this function.

DATA SOURCES CHECKLIST

SOURCES

INDICATORS

EXTANT

- National plans/programs
- National census
- Ministry of Finance
- Ministry of Health
- Regional plans/programs
- Central Bank
- Regional banks
- Administrative budgets
- Legislative history
- International studies
- International Development Bank
- Military
- University studies
- Institute studies
- Academy studies
- Multinational Corps.
- Professional organizations
- Licensing/credentials
- Admissions Offices
- Private hospitals
- Public hospitals
- Insurance companies
- Voluntary health care organizations
- Professional Journals
- Evaluative research
- Interviews w/knowledgable persons
- Interviews w/ experts
- Interviews w/ informed persons
- Interviews w/ community persons

ORIGINAL

- Normative group process
- Expert panels
- Commissioned papers
- Advisory panels
- Surveys of hospitals, medical schools, training organizations

- Demographic & Disease
  - population
  - disease/he-lth status
  - control/eradication status
  - health catchment area status
  - nutrition status
- Economic
  - National income Accounts
  - regional export base
  - personal income distribution
  - health expenditures
  - health service expenditures
- Health Personnel
  - personnel stock
  - service demand
  - training institutions
  - migratory patterns
  - facilities
  - preventive/curative programs
- Public Policy & Political
  - national development
  - health sector development
  - public policy constraints

Sources of interviews: knowledgeable persons: senior administrators, planners, analysts, legislators, newspaper editors, health care providers, clients/patients, politicians, military leaders, retired administrators, ministry of health statisticians.

Preliminary estimations should be made concerning the relative importance of each personnel category. Assuming both shortage and surplus situations, planners should ascertain each category's ability to deliver adequate services.

The length and cost of training should be considered in selecting manpower categories. Cost is important in allocating scarce resources, and training time is critical in determining how long it will take a person in each category to start producing services. For example, while the education of one physician may take ten years schooling and $50,000, training auxiliaries or health assistants might provide 200 practitioners of limited skills in the same time and for the same amount of money. The planners will not actually be making these decisions but will be determining what categories are generated and what information will eventually be available to the decision makers.

The planner will need to ask how adequate the presently available data are to the relative cost of collecting and analyzing supporting data.

The planner will need to ascertain the relative importance of each category's information to policy mechanisms, such as whether the health sector is the major or sole employer of the particular manpower category isolated, whether these categories are largely public sector as opposed to private sector, and whether there is a discernible utility for the information on the part of decision makers. Also, the planner needs to know of any adverse consequences of excluding a category from the list of one's catalogue.

It is essential that the planner be particularly precise in arriving at definitions of health personnel. It is poor practice to select a category, for example "physician", only to include medical doctors, licentiates, osteopaths, naturopaths, chiropractors, curandeiros, and herbalists.

It is necessary to have at least two (preferably three) vertical groupings in the system. This allows for professional, technician, and auxiliary levels within various categories. Some prefer to have only professional and auxiliary levels. Local conditions will dictate the most appropriate methods.

Each category has individualized issues which need to be considered. Physician specializations may distort one's understanding of medical practice and are hard to monitor and assess. One may wish to consider the "mix" of certain physician specialists.

Nursing classifications may suffer from the proliferation of various nursing categories and the newer uses for nurses (family planning, nurse clinician, pre-school child care, etc.). Midwifery personnel require special attention. Attention should be given to the specific requirements of deliveries, number and location of prenatal patients, standards of service delivery, relation of nurse-midwife to midwife, the use of the indigenous midwife, and the role of the midwife in family planning.

Family planning workers will require attention to the very personal implications of fertility control, relative costs per worker, the mix of workers (i.e., physicians, nurses, midwives, etc.), information and educational duties, contraceptive service provision, training with respect to abortions and sterilizations, and services to people in areas inaccessible to the mainstream of family planning services.

Pharmacy personnel issues include the difficulty of estimating supply of workers in an industry which can be predominated by the private sector, lax regulation enforcement, pharmacists with multiple employment, the relationship of pharmacists to increase in pharmaceutical sales and conversion of sales into personnel, underreporting of sales to avoid taxes, special role of dispensers, generic name issues, and the pharmacist's role as educator and therapist.

Dietetic and nutrition personnel are relatively straightworward in analyzing supply except for special precautions that need to be made in allowing for

significant numbers of non-health system requirements, for example those for schools, private firms, tourism, etc.

Dental workers will require attention to "DMF" indices (decayed, missing and filled) and their conversion to personnel requirements, limited demand in the private sector, dentist underutilization, progressive care implications, and dental practices as a function as related to the number of assistants and chairs.

Technicians and therapists are usually difficult to analyze. The major issue surrounding these workers are their categorization (physical, rehabilitation, occupational, vocational, oxygen, etc.) and description of their respective and discrete functions.

Public health workers face special issues such as the importance of this category (often overlooked), their borderline status (not entirely clinically nor completely environmentally involved) and the problem of whether actual work is done by public health workers or people from other departments or ministries. Many categories of workers fall into this grouping such as epidemiologists, public health administrators, biostatisticians, vaccinators, etc.

Auximiaries and medical assistants are a separate issue in the definition of health personnel. The shortage and maldistribution of physicians in many nations has led to the use of non-medical school trained workers to increase physician productivity and substitute for doctors in areas of physician scarcity. Many categories of auxiliaries exist at many different levels of training. The trend now is to have these workers perform certain medical functions that hitherto were performed (at least theoretically) only by physicians or nurses if at all. Some basic advantages to having this category of workers comprise the larger portions of the health manpower pyramid are as follows:

1) Auxiliaries can provide basic primary care to target groups and areas which are seriously underserved.

2) Physician productivity may be increased. Auxiliaries permit distinct diagnostic and curative functions to be accomplished at basic levels. Physicians are consequently freed for more difficult jobs.

3) Auxiliaries are usually more cost effective. Their training is shorter and less costly. More auxiliaries can be produced per health dollar, and geographical coverage is therefore increased.

4) Auxiliaries are usually more available and less likely to emigrate out of the country after training. They are also more able to communicate to rural people and more rapidly deployed throughout a nation.

5) The quality of auxiliary-provided restricted routing elementary care may be better than that of some physicians, since they are giving the same limited services repeatedly and may, therefore, be less inclined to become indifferent to the repetitive nature of the functions required.

The important issue for the manpower planner is full recognition of the function of these workers in a fully balanced primary health care system. These "epidemiological scouts) are keys to providing timely primary care to the population. The rewarding results experienced by the People's Republic of China and their "barefoot doctor" program provides one large scale example pointing to the potential success of utilizing such trained auxiliaries.

The trained auxiliary in the health center or health pose, especially if provided with means of communication and periodic supervision, may diagnose and treat a number of conditions which are amenable to prevention. These include the ones frequently affecting children: diarrhea, protein-calorie malnutrition, tuberculosis, anemia, intestinal parasites, measles, shooping cough, malaria, and certain aspects of accidents.

Once the organization has been identified, the planner then designates the variables which will be chosen for analysis. Several questions need to be resolved, such as:

1) How relevant is the proposed information to the basic manpower supply problem?
2) How can the information be acquired, and what resources and time are available?
3) Will direct or secondary sources of information be used?

Since it can be assumed that most developing nations are not in a situation where much of the basic statistical information is available for the development of the manpower plan, it is important to isolate those factors most important for conducting the manpower supply analysis.

The primary sources of supply data should relate to personal characteristics preparatory characteristics, and job related characteristics.

Variables within the category of personal characteristics include: age, sex, place of birth/nationality, marital status, race, residence.

Age and sex are critical to the plan for purposes of attrition estimates. They are both relatively easy to obtain since birth or graduation year is equally acceptable. Sex can often be identified by name or school or church records. Birthplace and marital status may also be culturally important and reasonably easy to acquire. Race is another variable that may be important to some countries or areas. Residence has doubtful value, but may be useful in creating a master list of manpower categories.

Preparatory characteristics seek to understand the past education and training of each worker. Often greater importance is attached to the type of health training and year of graduation, since such information will determine the kinds of jobs a person can hold and can be used in conjunction with school records to estimate personnel loss rates. Both items are relatively easy to achieve through indirect survey methods.

In assessing the adequacy of non-professional personnel, it is useful to know the years of general education. This information may be difficult to achieve. It is usually found through costly direct survey methods or examining government personnel records. The institutions where training was received, licensure status, and specialization and certification are less important variables. They may be useful, however, in assessing whether graduates of one school fare better in the marketplace than others, for clarifying discrepancies between the numbers of practitioners who appear in various lists and the actual number licensed to practice, and for assessing the quality and quantity of certain medical specializations. All of these indicators are reasonably difficult to achieve, and may need to be set aside and preferance given to obtaining more important data.

Of the several on-the-job characteristics and related variables, the most important are type work performed and the amount of time spent for each activity. These variables will yield information essential for estimation of personnel utilization, productivity, etc. It is generally useful to further subdivide these variables into those work areas dealing with direct service, administration, and research/training. In some jobs, the title alone indicates the type of work performed (e.g., X-ray technician) so detailed efforts to achieve a greater level of specificity may not be needed.

Specialization is useful in some groupings, in order to establish trends, but in most situations these types of specialities are limited. Depending on the country, they register preference (i.e., self-proclaimed specialities) or actual training.

Actual job titles, classifications, and functional area may not be especially useful. They are usually most useful for correlating occupational title with type of work performed. Often the effort involved in coding, tabulation, and analysis is more time consuming than the useful information produced.

Among the less essential variables are licensure status, post-graduate specialization, and previous work history. The former British colonies, in general, are exception to the preceeding observations. The nature of the educational system and government record systems are often considered superior and can provide useful data on work history, education, and personal characteristics at minimal cost in time and labor.

These variables are usually limited in use to a few professional categories which are difficult to code and tabulate, and superfluous to what the worker may actually be doing. Since both the time and resources available to most planners are scarce, these variables may have to be relegated to future collection efforts.

Selection of data sources is important. In the supply analysis area, there are three basic sources for this essential data: official sources such as registries, government offices such as the Ministry of Health, licensing boards; unofficial sources such as phone directories, membership rolls of societies, hospital records, insurance records, and direct sources collected by interviews with health workers.

Once the data base is determined, the personnel categories defined, and the particular variables identified, it becomes necessary to select one's basic source. This will require decisions as to the availability and accuracy of the data. When these decisions are made, it will fall to the planner to investigate several data collection methods.

Data collection methods for supply analysis are numerous. In addition to surveying the extant data sources, the planner will presumably wish to collect data from selected primary sources. This decision requires a basic understanding of the consraints imposed by fund limitations as well as the relative completeness and accuracy of the data needed. This type of data collection may be reserved for more long term or basic research studies.

It should be understood that the organizations and individuals which are to be surveyed may not be under government supervision. This situation may create access problems.

One objective which may be axiomatic to the health personnel planning effort is the development of a substantive reporting and information system within organizations. This can facilitate the input of quality and timely data for governmental planning needs. Planners are urged not to risk jeopardizing future relationships with a given institution simply because an institution is reluctant to provide data immediately.

Another basic principle relates to the reliability of information. The quality of certain training programs, for example, may be questionable. In any effort to upgrade program operations, certain discrepancies may be underscored. Consideration needs to be given, consequently, as to the usefulness of questionable data.

Another issue of importance is to recognize that those included in a health personnel study become comparitively more "important" than those excluded. Thus, no group of health workers can be ignored. Steps taken to decide the number and type of health categories has already been discussed; it is appropriate, however, to remember that status and political considerations may play a large part in the selection process.

It would also serve the planner well to use the concept of "full time equivalent" (FTE). FTE allows the planner to compare less than full time workers with full time workers through a conversion process. What constitutes a full time equivalent must be determined by the planner (usually the average number of hours worked per week in a full time government position).

The most effective method for gathering accurate health personnel data is to conduct a specialized census of health workers. The method takes considerable time and money and is normally prohibitive unless considered on a small sample basis, or if it is part of a longitudinal study.

The health manpower census can vary greatly from a relatively simple enumeration of the numbers of workers to a complex social science survey research effort. In the majority of cases, neither extreme will be appropriate. It can be expected that a beginning enumeration will be made by most planners. Subsequent refinement can be achieved through selective survey techniques.

During the phase of operations and sub-operations of the model, two sets of operations occur: description of health personnel recruitment, development and utilization process; and description of methods to project demand, supply and personnel allocation and utilization.

Both approaches should define how the personnel recruitment, selection, training, assignments utilization, rewards and evaluation systems operate. In deliniating one or more systems, it is important to know who)organizations and individuals) makes the decisions which define aspects of the personnel systems, the rationale for the decisions and the assumptions about resources which enter into the decision making. It is essential to understand the objectives of the components, how they relate to formal or quasi formal relationships. The user may find that the manner in which the problem is formulated determines the way in which the personnel development and utilization systems are ogranized. Problem formulation may have more to do with aspects of competing objectives and incremental change in the primary health care system than in formal objectives and plans.

Since funds for the recruitment, selection, training and utilization of personnel are normally very limited, the effect of this limitation on the personnel development and utilization must be a central part of this description analysis. A simplified format for this analysis is described in the following sample form.

EXAMPLE DESCRIPTIVE MODEL OF A HEALTH PERSONNEL DEVELOPMENT AND UTILIZATION SYSTEM(S) FOR ALL LEVELS OF HEALTH PERSONNEL IN THE NEAR PAST, PRESENT AND THE NEAR FUTURE (FIVE YEARS)

PROGRAM ELEMENT/ OBJECTIVES	STRATEGIES TO ACHIEVE OBJECTIVES	ACTIVITIES TO ACHIEVE STRATEGIES	KEY FACTORS IN DECISION MAKING BY ELEMENT	RESOURCES AVAILABLE
1. Recruitment Target populations (past, present, projected) Do they represent service populations?				
2. Selection/Assignment Selection procedures Motivation Problems Assignment procedures				
3. Preparatory Training remedial education personal habits social skills other curricula				
4. Vocational Training Map locations Define specific training Define preparation				
5. Job Development How are jobs determined? How are jobs filled? How evaluated?				
6. Utilization/Distribution Motivation & problems Upgrading				
7. Personnel Planning nature of planning system assessment system Describe relation of personnel and health problem planning				

CHAPTER FOUR

ANALYSES AND OUTPUTS

The analysis component forms the core of the analytical model. Here the analyst takes the input data and fashions it into findings and trends which interact upon the supply, demend, utilization, financing, and preparation of health personnel. This data analysis is divided into two sections. The first section analyzes the data which define the problem and the environment. The second section describes analytic approaches useful for determining the su-ply, demand, utilization, and preparation of health personnel.

Analysis of Health Issues and The Environment

Once the various indicators have been collected, the assessment instruments exercised, and the operations and sub-operations conducted, the planner faces the analysis tasks. Analyzing the issues and environment surrounding health personnel planning or assessment is largely a question of determining what one has done in the past, what is being done in the present, ascertaining whether what is being done is of any benefit, and projecting changes which might improve the situation should one's analysis indicate the need for changes. Since health status in developing nations is generally defined by various diseases of poverty and since the trained manpower and resource environment needed to overcome these diseases are at minimal levels, projecting changes are normally a given. Under the title of Outputs later in this chapter we will discuss the questions of analyzing outputs and offering changes. The present section suggests methods for determining present status, past status, and the quality of each.

The direct relationship between health and development is generally accepted. However, decision makers and planners often overlook this relationship with subsequent oversights and wasted resources. Since so many of the developmental packages that are overlaid on a nation are immense in scale, testing them through trial and error should no longer be acceptable. Rather, it is becoming essential that planners consider the interrelationship between any given action and the overall environment within which such an action either succeeds or fails. Such consideration should be made early in the planning cycle.

Analysis of the issues surrounding a health personnel planning project, and the larger national environment within which it will operate, will have a greater chance of being useful and valid if the planner is able to answer several critical questions. Answers to these questions should help determine the nature of the analysis being attempted, together with the timeliness and accuracy of the input to the overall developmental planning that the nation's decision makers are attempting:

- What resources are needed for the analysis?
- What resources are available for the analysis?
- What is the environment within which the analysis must be conducted?
- What are the primary outputs of the analysis?
- What are the secondary effects of the analysis?

In gauging the answers to these questions, the planner needs to know if the effects are desirable, their order of magnitude, the timeliness of their occurrence, and in what sector of the developmental economy such outputs or effects will be manifested.

To understand the first three questions, the planner should first conduct a detailed set of economic analyses which will outline the resources and environment of the developing nation as a whole. These analyses are usually a form of national or regional economic analysis, and personnel income distribution analysis. Such preliminary work provides an understanding of the universe within which the health personnel plan will emerge. Often such analyses are available from the appropriate ministry or department. If not, close consultation with local developmental economists should yield the economic analyses sought. Such an understanding at national, regional, and personal levels will help assure that the planner provides input which is realistic, given the overall intentions and status of the developmantal priorities of the nation. This enables the plan to avoid the pitfalls of suggestion actions for which timely and monetary responses by decision makers may not be forthcoming.

Analytic Approaches

Once the overall national, regional, and personal economic environment is analyzed, specific aspects of health manpower should be assessed. The important questions in this personnel analysis are:

- Stock and Specialty Analysis: How many different kinds of personnel serve in the health sector?
- Distribution Analysis: Where are these personnel located, and in what kinds of facilities are they located?
- Utilization Analysis: How are these personnel organized and utilized, and how productive are they?
- Policy Impact Analysis: What are the impacts of various policy alternatives on changing the number, speciality, distribution, and utilization of these personnel?

Stock and specialty analysis is not simply a matter of counting the number of physicians, nurses, dentitst, etc., and incorporating such statistics into the personnel plan. A unique set of variables exists in conducting a stock (how many?) and specialty (what kind?) analysis.

Less developed nations do not differ from more developed countries in being ruled by the axiom that where resources are scarce, planning is necessary. The differences between the stages of development in various nations is a question of which resources are scarce. In the area of health personnel planning in the developing nations, time itself is literally scarce.

Hall (1969) explans that the time frames for decision making and planning differ based upon what is being planned, the predictability of the future, the status and duration of the budget, and an administration's remaining time in office. He points out that while most developmental national planning timeframes are relatively short-term (five years), health manpower planning requires long time frames:

"...for most of the health professions, supply is essentially inelastic over at least a four- or five-year period and often for much longer. For a profession such as medicine, even a 10-year planning period is insufficient. Decisions made in year one can begin to affect supply only by year eight or nine. Furthermore, by using ten-year period, the planner risks either over- or under-responding to an imbalance in supply and demand observed in the base year of the planning

period. To minimize these dangers, supply and demand projections are made for a twenty-year period."

What this means for stock and specialty analysis is that special care must be given to creating a situation in which baseline data are accurate and reliable. Hence, the process of analyzing stock and specialities become largely one of making sure all germane sources have been contacted and all operations are verified. This may be done through a "sensitivity analysis" which seeks to estimate the potential error impact for each of the numerous data inputs in the system. This is accomplished as follows:

1) All data inputs relating to stock are gathered in one place and sub-categorized by specialty category.

2) Each data input is assigned a minimum-maximum value as to the probable extent of error in the input estimate. (For instance: if input from medical school records show 5-0 physicians in the country and input from the professional association for physicians shows only 420, the planner would assign an error estimate to each input based upon subjective estimates of the situation.)

3) Calculations are totaled for both minimum estimates and maximum estimates for each item of information (physicians, registered nurses, dentists, etc.). This will yield mini-max ranges for each item.

4) Given these ranges, judgment may be made as to which observed discrepancies warrant further refinement or additional verification.

Sensitivity analysis will point the way for further efforts to wnsure that these important baseline data are accurate. Next, review of the various organizations involved in manpower or personnel issues should be made in order to select those that may enable the planner to verify data or resolve discrepancies arising from differing numbers. These organizations and types of information likely to be provided are listed in a previous chapter. Any groups not previously contacted should be polled at this time if the need for corroborating data is great.

It will come as no surprise to the health personnel planner that one of the primary problems in the area of health service provision is that of maldistribution. In fact, there is growing realization that maldistribution is increasing. It seems safe to conclude that the problem of health manpower planning is the problem of distribution. Consequently, the planner's analysis of maldistribution should recognize at the least the following three aspects of this problem: geographic maldistribution, categorical maldistribution, and facilities maldistribution.

Production of higher amounts of health workers does little to solve a nation's health services problems if they are not located in the right places. Health personnel have the same tendency as other highly trained manpower to concentrate in the more highly developed urban areas. Generally, practicing in rural areas can mean isolation from other peers and a decreased amount of intellectual stimulation.

It will have little impact for the health personnel planner to promote the production of greater numbers of health workers if the question of rural distribution is not also addressed.

The question of density of health personnel is one which requires a great deal of study if appropriate policy options are to be derived. An appendix of this manual lists some incentives that have been used to promote greater interest in rural service.

Analysis of geographic maldistribution may be done by ma-ping the numbers of various categories of health target personnel onto geographic regions of a given country. One also must map the population distribution and calculate manpower/ population ratios related to primary care. Specialty care may be

excluded at this point since this will of necessity only be provided in urban areas. Such regions should be further crossmapped to take into account rural, urban, and periurban distinctions. Another useful analysis would show health personnel crossmapped with the extant health facilities in their respective locations.

The second serious form of maldistribution concerns the discrepancy between various categories of health workers. Any given country's health service pyramid will show a specified number of professionals, technicians, and auxiliaries. Imbalances between the relative sizes of these groupings will cause severe dislocation in service. In many developing nations, no recognition is given to the need for a greater number of auxiliaries than technicians, and likewise a larger number of technicians than professionals. If, for example, money and time is spent in developing physicians at the expense of doctor's helpers or other related auxiliaries, the categorical maldistribution of health personnel will grow. The planner needs to be aware of these imbalances as well as those between various medical specialties or occupations.

When the categorical maldistribution issues are recognized, therefore, it is not only important to have health personnel in the right places, but also is important to have the right health personnel in the right places. Analysis of this problem is relatively easily done given valid data. Occupational specialties are simply overlaid onto the geographical mapping which the planner accomplished previously. Generation of professional to technician auxiliary ratios may then be derived for each region, area, or location of the country. This will begin to specify the extent of the distribution problems.

The third aspect of distribution analysis that needs to be considered is the relationship of personnel to facilities. This analysis is accomplished by mapping the staffing data for each type of facility (university hospitals, urban health centers, regional dispensaries, village health posts, mobile units, etc.) on the extant maps prepared. This step requires the use of more detailed data, but this has presumably been provided by work conducted earlier in the model.

The planner must consider underlying questions. The questions underlying distribution analysis are admittedly much wider than those which can be addressed in this manual. What has been suggested are preliminary mappings of critical data that can yield information from which analysis and policy inputs may be made.

A third analytic approach (after stock/specialty and distribution analyses) involves consideration of the utilization of health personnel. This analysis is concerned with qualitative questions, e.g., how well are the personnel in the health system being utilized? Analysis of this type will require knowledge of the potential productivity of each type of health personnel category and historical data on the ability of each group to approximate that potential. The manpower planner, consequently, needs to constantly be aware of the nation's ability to support additional health personnel. These costs may be estimated based upon the particular demand model constructed.

The best policy analysis process involves the use of decision makers from the very beginning. At this particular stage, the planner can continue developing policy alternatives, and assess their respective impacts on the environment. This analysis may proceed much more slowly than the others mentioned previously since input will be required from all concerned parties.

The first step in this policy impact analysis is to reconstruct the present operating environment as closely as possible by providing the demographic, economic, health personnel, and public policy data collected in this effort in ways which reflect the products of the various analyses conducted above. This mapping provides the base from which alternatives are derived. If the process has been an ongoing one, these alternatives should have surfaced much earlier in this work and would now be undergoing a process of refinement.

Secondly, these alternatives are analyzed and synthesized into potential policy actions of a very specific nature (e.g., open W number of new medical schools, substitute X physician services with those of auxiliaries in Y ways in Z regions). Such alternatives may be organized in any of a number of ways: by region, by occupational category, by sections and sub-sections of this model. The organization probably does not matter as much as the scope, definition, and detail of alternatives. A reasonably useful method of organization was suggested in the U.S. Department of Health Education and Welfare, Office of International Health's Syncrisis series (volume III, 1972) and amended for our purposes as follows:

1) Environmental Definitions: It is suggested that the definition of the environment within which health manpower policies will be impacted is composed of several more or less discrete components which may be operative at any particular moment. Each component will have quantitative and qualitative dimensions. The components include:

- Physical (geography, climate, water and sewage systems, electric power, transportation, etc.)
- Political (consideration of the processes by which the society determines who gets what)
- Intellectual (quantity and quality of skills available or able to be available in the short term)
- Social-Cultural (extent to which the society is receptive to the alternative based upon its traditions and institutions)
- Psychological (degree and intensity of attitudes, fears, and support of the alternative by the providers and users)
- Organizational (extent to which the alternative may be supported with administrative, managerial, and information systems)
- Spiritual (religious and philosophical predispositions of both users and provider toward the alternative).

Once the environment is determined and the potential results or outputs are derived, it becomes imperative to begin the search for those changes in the environment which may occur as a secondary effect of the policy action. Such a search will recognize that any health manpower planning action may have both the desired result planned for and many other outcomes which were not anticipated. This step in the process attempts to predict secondary effects by determining what, when, where, and how they will occur, at what cost, and with what level of social desirability.

Outputs

The analysis component has defined the key factors which determined and influenced health personnel planning. This section defines the outcomes of a set of resource allocation processes. In simple form, health personnel planning is a means (1) to determine available resources, (2) assess problems requiring solution, and (3) suggest steps necessary to provide personnel in order to address the problems.

The outputs from an analytic system are measures of system performance. They serve as aids in planning and analyzing policies and programs. The procedures can lead to the determination of major policy alternatives. The actual analysis is seldom simple. The objectives are often multiple, conflicting and obscure; alternatives are not sufficient to attain the objectives; and measures of performance are inadequate. The key to successful analysis is to continually formulate the problems, refine and add to the data base, examine alternatives, debate objectives, involve key decision makers, feedback the findings, and , given the

problems, continue to define or refine the optimal objectives for health personnel development and utilization.

The efficiency criteria used to assess the products of the health personnel utilization system are:

- Labor and personnel salaries, expenses and time expended to complete a defined task for each level of health personnel.
- Equipment, supplies, facilities, maintenance, repairs and replacement costs necessary to complete a defined task for each level of health personnel.
- accessibility - the transportation and/or communications costs related to the completion of a defined health service task.

The effectiveness criteria used to determine how populations are served (and target problems are being met by health care personnel) utilizes various performance criteria in order to assess the manner in which personnel are utilized:

- Expectation - the ratio of actual outcomes to expected outcomes where the expected outcome is a quantified goal, objective or program.
- Operability - the subjective value of the ease with which the health personnel are being employed based upon a scale of 0-3.
- Reliability - the frequency or successful utilization of personnel to address a target population or problem based upon a subjective scale of 0-3 for each objective or target.
- Working Life Expectancy - the period of time for which each category of health care personnel can be expected to be employed before the personnel cease to function.
- Utilization - the manner in which each category of health personnel is being utilized.
- Applicability - the degree to which the current health care personnel assigned to target populations or problems meet the needs or requirements.
- Versatility - the range of services for which the personnel can be used to meet goals, objectives, needs, and requirements.
- Coverage - the percent of the target population able to receive necessary health care services concurrently.
- Training Prerequisite - the degree of specialized training necessary or assumed prior to providing the required tasks.
- Synergism - the manner in which the health -are personnel when combined with others can affect the achievement of stated goals, objectives or programs.
- Constraints - political, legal, social-moral, or professional-ethical constraints placed upon employing each category of health care personnel to address problems.

The process criteria assess the nature of the recruitment, selection, training, and employment of health care personnel. Supply-demand criteria include:

- Producers of personnel - the distribution of universities, colleges, training programs and institutions which are currently producing health personnel at any level.
- Recruitment Population - the potential health workers who can meet health care category requirements and who may be interested in training and employment.
- Awareness of Services - the percent of the recruitment population aware of the training and employment appointments in health care.
- Availability - the current and projected ratios of the supply of health care personnel available to the quantity of services needed based upon the priorities.
- Lead Time To Create - the length of time needed to produce personnel for any level of health care.
- Resources Required for Distribution - Additional costs of resources needed to distribute health personnel to target populations.

- Opportunity Cost - other ways that health personnel resources can be used.
- Economies of Scale - the decrease in resource requirements as the supply of health personnel increases.
- Substitute Personnel - the expected number of health care personnel which could achieve the same objectives and serve the same target population.

Necessity-Luxury criteria refer to the perceived need for each category of health personnel based upon a scale of 0-3.

Status appeal refers to the perceived degree to which national or professional pride creates a demand for various categories of health personnel based upon a scale of 0-3.

State of the Art is the degree to which the preparation of health care personnel relies upon available scientific and technical expertise based upon a scale of 0-3.

Task analysis is the utilization of task analysis or work measurement as a means of determining personnel assignments based on a scale of 0-3.

Career Ladders is the utilizationof career ladders for upgrading auxiliary and technical personnel based upon a scale of 0-3.

Equity criteria measures the distribution of health personnel in terms of a number of indicators.

- Distribution by region or planning district: map the ratios of health care personnel to population by planning district or region.
- Distribution by target population or target problems: map the distribution of health care personnel by category with target populations and real or a priori target problem.
- Morbidity-Mortality: map the distribution of health care personnel by category according to measures of morbidity and mortality.
- Length of life indicators: map the distribution of health care personnel according to planning district or regional length of life indicators.

Each planning or analysis/assessment effort determines the nature of the actual outputs. There is a tendency to overlook equity information in planning and analysis. This is a serious mistake which may leave the decision maker with a distorted picture of policy choices. The outputs section usually reduces information gathered in other sections into comparative rankings using simple statistical measures. The 0-3 ranking is suggested here as a means of ordering choices. In some cases the simple listing of aggregated costs or cost comparisons is necessary. Wuite often the listings are based upon comparative means, medians, modes, ratios, proportions or rates which can be ranked in decision matrices.

Feedback

There are at least two ways of viewing the "feedback" section of the health manpower planning /assessment model. From the first perspective, feedback highlights those issues which surround what one does with the derived data base, the instruments that were used, the operations conducted, the analyses completed, and the outputs generated. From a second perspective, the feedback component concentrates on those issues or actions which can, in fact, upgrade the status of the policy makers with the greatest latitude in decision making. Productivity and migration are the two primary issues.

There are at least four major areas of improvement available to the planner to feedbackto policymakers with respect to upgrading health personnel productivity. These relate to: quantitative improvement, qualitative improvement, distributive improvement, and technological improvement.

Quantitative improvement requires the production of more services per worker. In this case, the planner must quantify the amount of service per category in useful terms (given the status of the statistical base available). These service units necessarily will be arbitrary, but relevant for analysis. Out-patient visits, in-patient days, public health nurse home visits, inspections made, physician clinic attendance, number of injections, villages covered with X amount of a service, and so forth, are all acceptable service units if discrepancies and exceptions to the rule can be factored out with reasonable efficiency. Productivity trends are then established over time and the extent productivity increases and decreases observed. This information is then fed back to policymakers within the perspective of the plan.

Qualitative improvement requires the production of better service per worker. Quality improvements are difficult to judge since they largely depend upon the skill and its application by each worker. The number of these judgments is directly comparable to the number of workers in the system. Who determines what is good, better, or best service is unclear in most situations. Generally, at least three approaches to this problem are offered: expert assessment, patient satisfaction, and official norms.

The judgment of experts about what constitutes quality care can be reasonably quantified by stipulating what procedures are necessary for each health care job or responsibility; observations are then made on a sampling basis to derive quality levels. These are then compared and cross mapped over time. Patient satisfaction, however, usually is a poor quality indicator in any other than a free market situation due to the question of choice (public vs. private care opportunity) and the fact that few patients have enough experience to judge well the competencies of health workers. Official norms or standards for medical practice (which usually follow from expert assessments) are useful in quantifying various activities or costs, but less able to assess quality of care rendered by practitioners.

Distributive improvement implies that productivity may be improved by more equitable distribution of personnel geographically by specialty, or by arranging for more appropriate facilities. Various modalities (inpatient as distinct from outpatient care, preventive services, ambulatory care, etc) of health services comprise a significant difficulty in this productivity assessment.

Choices in this area are often not as straightforward as might be implied. The frequently incomplete data bases are unable to yield information useful enough to derive productivity indices. Cross tabulations of various personnel categories, which facility shown by treatment modality, may generate a base from which the planner can begin to derive distributive judgments about improvement of care.

Technological improvement is also measurable. New and better drugs and surgical techniques, as well as improved diagnostic and therapeutic hardware, have contributed to important increases in productivity of physicians in the developed nations. These improvements are making their way piecemeal into the developing nations with subsequent patchy improvements in productivity. Whereas certain societal infrastructures are aiding these increases in productivity in the West, these same results do not exist in the Third World. Telephones and paved roads are technological advancements which may provide an infrastructure for lessening house calls, increasing speedy transport of personnel and medication, facilitate inter-specialist consultation, and various other innovations unavailable in many developing nations.

Indeed, the dynamics of health differ so widely in these nations that health sector productivity is often an issue much wider than the health sector.

Assessment and planning for appropriate technological improvements and innovations must, therefore, understand the constraints, such as: inappropriate equipment or supplies; poor organization and/or administration; higher incidence of preventable diseases; inability to provide early hospital discharges due to unsatisfactory home conditions; and delays in seeking madical treatment due to cost, travel distance, fear, and superstitions. Productivity improvement from use of high state-of-the-art technology is not always the most rewarding alternative.

The flow of health professionals into (immigration) and out of (emigration) a developing nation is an issue of great concern to the planner. Since the loss of human capital inhibits the rate of development in many sectors of a developing economy (including health), attention to the dynamics of this "brain drain" is important.

While the scope of the problem is not easy to determine, the implications of the problem are clear. The size of the investment in training, the lost skills, and the multiplier effect of other potential losses in related sectors of the developing economy all make the issue critical. Determinations of the scope of the problem are hampered by the fact that most nations know who comes in, but not who goes out of their nation, since travel out may be for many reasons other than migration.

Gish estimates that 5,000 physicians annually migrate, or about one eighth of the total world's medical school output excluding the United States and the socialist nations (1971). Estimates representing the scope of the migration problem vary. Gish argues that since 1976 increased medical school output in industrialized countries and new restrictive immigration procedures have reduced the scope of the problem to less significant proportions.

The factors which attract health personnel to emigrate are as unique in a literal sense as each migrating professional. Generally, personnel are attracted overseas by wealth, professional fulfillment, and relatively more freedom to pursue personal goals. Far more important are the preventive measures planners may suggest to policy makers should the extent of this problem become apparent and policy options required. The measures were divided some years ago by Gollin (Conference on International Migration of Talent Skills, U.S. Department of State 1966) into three groupings (Baker, et.al.,1968).

Prevention: These include efforts to lessen those things that prompt the health professional to emigrate. The creation of a central manpower planning function, monitoring of worker outflow by various occupational rosters, strengthening or creating programs that can supplant overseas study situations (which often yield unintentional migration) and programs which foster opportunity for service with planned opportunities for training and promotion will provide steps toward prevention. Additional measures include limitations on issuance of passports and imposing various taxes for study and travel abroad.

Restoration: Policies which seek to lure the emigrated worker back to his country temporarily or permanently comprise a second category. Publications, newsletters, and office in foreign countries (such as the U.S.) which list job openings in the home country all have been tried with varying levels of success.

Restriction: These efforts seek to inhibit emigration in the first place by some form of restriction. Some of the items listed above are restrictive if applied prior to a worker's departure (and hence are not restorative). Others includerural service or military service requirements, stiff repayment schedules for government provided training, and obligatory hospital service for the government. These programs depend for their success upon the acceptance of the occupational grouping involved; circumvention may be a secondary effect of greater importance than the initially worthwhile objective.

CHAPTER FIVE

APPENDICES

APPENDIX A

DATA & INDICATORS NEEDED FOR ASSESSMENT MODEL

Demographic and Disease Data/Trends

Defining the context of health personnel planning requires an understanding of the demographics and disease status of the area under study. The health personnel planning context suggested here includes status indicators such as population, diesease and health, control/eradication, health service catchment area, and nutrition, along with data from which analyses are corrected. These vital statistics provide a proper understanding of the environment, thus assisting health manpower planners. It should be remembered that not even the most sophisticated countries have all of this data available for health personnel planners. The data listed constitutes very broad indicators of health or illness and are needed to design a personnel staffing plan for policy makers that recognizes the constraints of resource scarcity.

a) Population Status Indicators: The planner should begin with population to obtain the overall picture. This will help define the universe within which the personnel plan will be formulated. The following indicators have been culled from various population inputs and are of special interest to the health manpower planner. Available statistical experts should be consulted for further refinement.

The basic population status indicators are: population size/number; geographic distribution; age; sex; density; race/linguistic groups; religious groups; economic levels; future projections of growth and sources of information; social security infrastructure and benefits; education levels; proportion of school age attending; literacy levels by area; labor force and mix by occupation; socio-cultural orientation: religious attitudes, receptivity to modern medicine; estimates of health service demand and need by population group; acceptability to population of service types currently delivered by different categories of personnel.

b) Disease and Health Status Indicators: In developing nations, the high rates of mortality, morbidity, and population expansion may reflect either a scarcity or actual absence of health services. This problem can be graphically demonstrated by the World Health Organizaton's statistics which point out that, of a total of 1.5 million physicians in the world, 1.2 million live in developed countries and serve one billion people, leaving 300,000 physicians in the developing world to serve 2.5 billion people. This means, in effect, that most rural areas of the developing world have only one medical doctor for every 50,000 people (compared to 1 in 700 for North America). Consequently, the health problems of the poorer nations are legion. The need for health manpower is highlighted, therefore, so that planners do not lose the perspective from which the health personnel plan is being considered.

Given below are the more important health and disease status indicators:

- crude birth and death rates, as well as the direction of changes
- infant and maternal mortality rates
- life expectancy
- mortality rates by age and by disease
- density and geographic distributions of disease
- rural-urban breakdowns of disease patterns
- morbidity rates, including data on outpatient visits, hospitalization, infectious and parasitic diseases, zoonotic disease, mental health and accidents

- distribution of estimated physician hospital visits and discharges
- actual hospital discharges per bed per year (resulting in patient turnover per bed based on average length of patient stay)
- visits and discharges per full time equivalent physician year by sector and employer.

c) Control/Eradication Status Indicators: Once the planner has estimated the population dynamics, as well as the nature of key diseases statistics, it is important to understand current approaches to conditions described. This is accomplished by the accumulation of data on control and eradication measures, on the status of various health service catchment areas, and on the nutritional status of the population. Those indicators which enable the planner to better understand the control and/or eradication of various health problems are:

- health program descriptions, including coverage, cost, utilization, quality, and efficiency for both the private and public sector
- principal providers of health programs
- immunization programs (especially tuberculosis, tetanus, smallpox, measles, and diptheria). Statistical results should be arranged by area and population.
- maternal and child health program activities
- proportion of women who receive prenatal care
- percentage of births which are supervised
- family planning programs: average and ideal family size, continuation rates, percent acceptors of such services, legislation affecting family planning, and laws affecting use of contraceptives.
- general medical care programs for both outpatient and inpatient.
- health education programs, including school and occupational health efforts.
- vector control programs
- environment sanitation , including: facilities, proportion of the population served with potable water supplies and sewage (quantity and quality) refuse disposal, ongoing and proposed projects and programs, rate of production of new sanitation services and cost, distribution of services, urban/rural food sanitation controls.
- sewage control activities
- water purification activities
- efforts to flouridate water supplies
- limitations on expansion of services and government priorities in health service areas.

d) Health Service Catchment Areas Status Indicators: While section C is devoted to covering the nation as a whole and some of the broader national control and eradication efforts, this section defines the status of health services improvement at a more local or regional level. It focuses on the impact of educational programs, health facilities, transportation, and housing. Whatever the local case, the recognition of catchment areas, e.g., geographically defined service areas, provides a useful benchmark for comparisons within a country. It also serves to further highlight the larger issues of distribution and utilization. Information provided by such catchment areas influence policy makers to plan for decentralization of the health personnel pyramid. Much of the information required for the following health service catchment area indicators may not be "officially" collected, and can only be acquired through subjective observation.

- catchment area location
- careers offered at each location (by name)
- number of health workers per health career by location
- enrollment in training by location on an annual basis

- the annual number of graduates by career and location
- the cost per student by year, career, and location
- the average cost for gra[illegible] by year, career, and location
- the average salary for f[illegible]lty member, by career, location and year
- the number of classrooms by year, location and career
- the water supply status, by location
- the number and type of health facilities by catchment area
- the numbers and distribution of inpatient and outpatient servi[illegible]es by area, including hospitals, clinics, medical laboratories, blood b[illegible], pharmacies, ambulance services, and other specialized units, size of faci[illegible]ies, type of equipment, and population/hospital bed ratios
- the transportation infrastructure by area
- the housing conditions and settlement patt[illegible]ns by area
- geography and climatic conditions of an area.

e) Nutritional Status Indicators: Nutrition deserves special emphasis since so many of the health conditions of a country or area depend on the availability of a basic, adequate supply of the right kinds of food. Adequate nutrition cuts across national, regional, and local boundaries. While not a disease, malnutrition is certainly a significant state of aggravated poor health. It does not easily fall under the previous control/eradication status groupings. Nutritional status indicators include:

- incidence and degree of malnutrition (Gomez or Waterlow scale by area)
- type dietary deficiencies, links between the food consumed and the most prevalent deficiency diseases.
- analysis of food consumed, including amount imported and domestically produced, as well as the type agriculture, livestock, forest, and fisheries.
- average income and food prices, government price supports, government sponsored additives to bread and/or soft drinks, average disposal income, percent of income spent for food, household consumption, and effects of subsistence agriculture.
- production consumer chain, seasonal variations, urban, rural influence, storage transport, distribution, processing and marketing.
- dietary habits, taboos, estimated population "at risk", weaning practices.
- subsystems relating to nutritional status, protein gap, effects of morbidity on nutrient need, effects of environmental sanitation on health status, parasitic load/ utilization of food consumed.

Economic Data/Trends

An understanding of the economic base which supports the economy and the health sector is important. Since the importance of these data may be intuitively known by longtime residents of an LDC, it is only necessary to consider extensive health information within the context of the LDC's overall developmental economics when the health planning process reaches a certain level of sophistication. As this becomes necessary, economic time series data may be appropriate for this process. Such data should begin at least ten years prior to the time of the analysis and should be projected into the future. All economic time series data should be based upon r (constant) values of the national currency.)The constant value is the value of the currency in a base year less inflation of the currency for each of the subsequent years. The real value of money, consequently, changes with inflation. A five million dollar budget in 1967, therefore, may be equivalent to a 7 million dollar budget in 1974 using constant dollars).

Such economic indicator data areas include the following.

National Income Indicators:

1) Gross National Product. This is the total value of goods and services produced during a given year. It includes government purchases, personal consumption and domestic private investments, and the net export of goods and services.

2) Net National Product. This is the gross national product minus depreciation of investments. It is the sum of consumption plus the net foreign and domestic investments (gross investment minus depreciation plus government expenditures on goods and services).

3) National Income. The national income is the sum of wages and salaries, interest paid, income from rents, income from unincorporated enterprises and corporation profits in any one year.

Regional Income Indicators:

Within any country there are regions which are defined by geographic, political, historical, tribal and/or economic boundaries. These regions, especially those which are partially defined by economic boundaries, interact economically in the production and consumption of goods and services. They export and import goods and services among themselves and with the rest of the world.

Those exported goods and services are considered the export base. This part of the regional economy is the economic base. Its growth or decline has a major impact on the economic health of the region.

Health personnel analysts and planners may need to know the nature and trends of the regional export base. The changes in the export base effect population migration and i-portation of skilled or new workers. This comes sometimes at the expense of local workers who are employed but untrained. The question the health planner may wish to address is "What are the costs to small producers of export based growth?"

To understand these issues, it would help to know:

- the number and type of export creating firms and organizations,
- the levels of employment in such firms,
- their trends in sales or employment,
- government plans and expenditures to stimulate or improve the export base in the subject regions,
- the nature of the regional development plans, including economic, infrastructure and communications, and social service development and land use.

Personal Income Distribution:

Data on the distribution of personal income over time may need to be determined. In addition to the distribution by numbers and types of persons, data may need to be obtained upon the distribution by census, political or planning district. These data are useful in making estimates about the probable potential recipients of public health services.

Despite the fact that some income distribution figures include non-cash income, usually this data will not reflect the living conditions of the traditional or "have not" sector where barter may be more prevalent than the exchange of money for the purchase of goods and services. Personal income information gives a shorthand look at the extent of the disparity between the "have" and "have not" sectors in a dual economy.

Health Expenditures Indicators:

Total health related expenditures by government includes the budgeted and real expenditures by the national government, although some of these expenditures may not be readily available, especially in the field of environmental health and nutrition. The allocation of the funds over time across the defined regions

should be derived as well as budget allocations to the health sector)percent of government budget spent on health). Analysis of other expenditures might include: contributions to health through budgets of local governments, social security, community development, public works, agriculture, and education. The analysis should provide breakdowns of allocations by category, i.e., capital invested as well as current operating expenditure, including cost of salaries, administration, maintenance, and supplies.

International public expenditures: These are usually of a capital or program capacity building nature, and have a significant effect on the nature and level of health related expenditures. Data should also be gathered on the grant and aid programs projected for support from international sources. These include UNICEF, WHO, and other UN organizationa; the World Bank; IDB; U.S.AID and Peace Corps; SIDA; ODM; DANIDA; foundations, and others.

Private sector expenditures: The allocation of private sector funds to health related functions over time should be determined and projected across the defined regions. The expenditures and trends may include voluntary and religious agencies, insurance programs, occupational health programs (if present) and private health related practices.

Service Expenditures Indicators:

1) Program Costs. The expenditures made to plan and implement programs, especially those of a disease control, public information,prevention, or public health nature, should be obtained to a reasonable extent. They are derived from secondary data sources. The expenditures for these control, prevention, and public education programs may be historical, current, and forecast.

2) Service Costs. The costs for providing health services of a diagnostic and curative nature may be determined if secondary data sources are available, though they may be very difficult to estimate. Such types of cost estimates over time can include:

- average cost per inpatient
- average length of hospital stay
- average cost per hospital bed
- average cost per outpatient treatment
- average cost per vaccination
- percent of family income spent on health.

Health Personnel Data/Trends

When taking the creation of an appropriate collection of health services workers by occupation and skill level as a primary goal of health personnel planning, it follows that every "mix" of these workers will be unique to each particular country doing health planning. Since each nation must decide for itself what constitutes "appropriateness" in the collection or aggregating of these workers, the personnel plan should be grouped compatibly with the resources and intent of the policymakers deciding these issues. To be most effective, such health planning should be done within the framework of overall national development planning so the degree of resource scarcity can be ascertained and an understanding of the appropriateness can be achieved

Manpower/population ratios may often be developed without attempts to match supply with demand. Such ratios as physician/population may be an indication of needed manpower or a reflection of desired improvement. These ratios tend to become offhand ways in which one country measures itself against the progress of another country. While a physician/population ratio may have some validity

when discussed in context with numerous other factors, ratios of this kind often are used instead of other more appropriate data elements, thus conceying an inaccurate picture of a nation's health environment. Some data elements relating directly to health personnel data, likely to be appropriate for most developing nation applications are:

Personnel Stock Indicators: The basic stock or volume of health workers is perhaps the most important data in the health personnel data area. From this data the basic operations and sub-operations analyses determining a personnel plan can be made. Planners should make every effort to secure the stipulated data, which are:

- current stock by category (physicians, nurses, etc.)
- current stock by area (for distribution purposes)
- current stock by facility (hospital, clinic, village center, etc.)
- current stock by sector)public, private, military, etc.)
- current stock by training level
- current stock by activity status (active, temporary, retired, etc.)
- current stock by age and/or years of service
- population/personnel category ratios
- staff type/patient ratios by area and by facility
- average hours worked per week by category
- wastage by resignations, death, retirement.

Service Demand Indicators: The basic indicators of existing service demand in the health personnel data area are designed to yield tentative answers to such questions as: Who are the patients and to what extent are they representative of the overall theoretical catchment area's population treated in the various facilities? The indicators are:

- number of in-patient days by age, sex, disease, area
- length of patient stay by age, sex, disease, area
- occupancy rates of various facilities by age, sex, disease, area
- patient visits per day, facility, and location
- number, type and location of vacant personnel positions and trends
- expansion plans of various facilities
- number of hospital beds and admissions per area
- drug and pharmaceutical statistics
- legislative initiatives in health area

Training Institution Indicators: After gathering data on stock and service demand to ultimately yield supply and demand calculations, it is important to begin to understand the capacity of the health manpower system to generate new workers of various categories. For this reason, various data elements in the area of training and educational institutions examined are:

- number, type and location of training institutions
- enrollment for current and past five years per personnel category
- duration and type of curricula with details on prospective major changes
- rate of production of personnel category (degrees granted and/or graduates for each year per career)
- certification and licensure practices and requirements.

Additional elements may be of interest as escalating levels of sophistication are achieved:

- staffing by specialty and degree as related to student load
- planned and actual intake capacity per institution per area
- attrition rates per year (as able to determine).

Migratory Pattern Indicators: Investigation of these pattern may be especially important to policy makers, since production of newly trained personnel is not very useful if the personnel do not remain where expected. The kinds of data the planner might be concerned with in setting the stage for the health manpower plan are:

- annual net immigration by personnel category and age
- annual new emigration by personnel category and age
- number of foreign medical degree validations
- number of foreign medical ancillary health care graduates
- estimated return rate (difficult to ascertain).

Facilities Indicators: It is essential for the health manpower planner not to ignore certain basic aspects of a facilities approach to planning. Here it is only important to recognize that specific data elements are useful in the final operations and sub-operations which yield the manpower plan. These include number, type, and location of:

- national health facilities
- regional health facilities
- district health facilities
- rural and village health facilities
- hospitals, research facilities, schools, clinics, health officers, and mobile clinics.

Preventive and Curative Programs Indicators: There are a series of data elements that concern various programs which directly employ health workers. The planner should recognize the presence of these programs in order to avoid policy recommendations leading to duplication of costly programs or facilities. These indicators include:

- number, type, location, and staffing levels of family planning, dietary, and dental programs
- number, type, location, and staffing levels of various allied and public health programs
- drug and pharmaceutical supply statistics per program and per facility (if reasonably and readily available).

Public Policy Data/Trends

The allocation of public resources is a complex area subject not only to the rational problems of human, capital, knowledge, and infrastructure (development) constraints, but also to the mixed motives of the various decision makers. The mixed motives include values, principles, world view, self advancement, greed, envy and the so-called human foibles. The implementation of public policy is also affected by the competition among ministries of government for scarce resources and the economic ups and downs of the country.

The health personnel analyst and planner must have a working knowledge of a number of public policy indicators, as well as a sense of the state of the art and the sophistication of the planning and delivery systems. Then judgments can be made about the reality of the goals and objectives of plans and programs.

National Development Indicators: The plans for national development as well as the data on implementing the plans should be analyzed, including the goals, objectives, targets and base statistics. The allocation of resources over time in constant money by region and by objective target is needed so the health plan may be within the context of overall developmental priorities.

Health Sector Development Indicators: Prior and existing plans for the development of the health sector, including infrastructure and rural primary care programs, should be analyzed. Data collection relates to the plans and programs over time, the expenditures by objective, targets, regions and program, and any studies about the actual implementation of the plans and programs. Personnel development plans, objectives, targets and programs are a priority, with emphasis on the personnel development plans.

There are a number of constraints in the development and later implementation of national health policy. These data are usually empirical or normative in nature, and should be carefully collected in order to be as objective as possible.

Fiscal constraints: Economic factors are the primary constraints involving the allocation of money for national health programs. Other fiscal considerations are:

- balance of payments problems
- heavy expenditures in another sector
- other priorities such as infrastructure
- high inflation
- large private sector investment

Administrative constraints: What is the nature of the Ministry of Health and its leadership? What is the organizational structure? How are planning decisions made? How realistic are the plans and programs? What formal or informal administrative issues govern the implementation of health and health personnel development policy?

Legislative constraints: What are the opinions, ideas, and attitudes of legislators (where present and active) regarding the development of a national health policy, health services delivery system and health care in the rural regions? What impact does the legislative role have in formulation of health policy?

Social-Cultural constraints: What are the norms and values of the populace, especially those primarily affected by public health services towards those systems? How have the rural and indigenous populations responded to the disease control, disease prevention and environmental health programs? Can these attitudes be determined for the predominately rural regions? Can the attitudes be attributed to causal factors? Are there current strategies to address the constraints?

Capacity for Self Help: Since development of local primary health care programs is often the responsibility of planners who live a long way from the target region or community, the involvement, leadership, and control by local persons for these programs is usually an untapped resource. It is especially germane, therefore, for rural regions and communities to take leadership roles in improving their primary care and preventive health programs within the local context. In deriving a health manpower plan, information on the capacity for self-help should be supplied to policymakers on the type of local resources each community can generate (construction of minimal facilities, provision of trained community health workers, provision of environmental health leadership, and fund raising or provision of other resources.

APPENDIX B

METHODOLOGY FOR DETERMINING HEALTH PERSONNEL NEEDS

Demand Projection Operations

The following methodologies represent reasonably simple estimating methods for determining health personnel demand. The user is cautioned against using methodologies which may overlook alternative uses of personnel, or the manner in which problems are addressed. Inherent in the methodologies are value judgments and norms. However, the methodologies may be used comparatively in order to determine alternative uses of personnel.

a) Health Personnel/Population Ratio Method

The personnel/population ratio approach is used to assess the adequacy of the current health personnel situation, to examine the distribution of personnel, and to project the number of individuals required by health personnel category.

The difficulty with the ratio method is that it does not provide information about the users of either (or both) preventive or curative health services. In addition, the ratios assume that the demand for services (ability to pay, inclination to use the services, available support services) is given and desirable.

Recognizing trade-offs among competing priorities for use of health personnel funds can make the ratios more functional. The basic value in the health personnel/population ratio mtehod, however, is its simplicity. By replacing population data with data pertaining to target populations, the ratios take on even more meaning.

Data requirements needed to apply the method are: area target population statistics, and statistics pertaining to the ratio of health personnel to population for various health personnel categories.

Manipulations of the desired ratio among the health personnel categories can provide a sense of alternative budget requirements and the time needed for training personnel to achieve the desired ratio. However, these projections are based on the assumption that the population, economic characteristics, and demand variables remain constant.

The simplest form of the health personnel/population ratio approach is:

Health Personnel Requirement by Category = Population X Desired Ratio

The current requirements are calculated by multiplying the present target population by the selected ratio; future requirements are determined by multiplying the projected population by the desired ratio.

From the extant data sources the analyst determines:

- current target populations requiring curative services
- projected target populations requiring curative services in future years
- the current ratio of village health workers
- the desired ratio: 15/10,000 or .0015, for example.

Computation:

current status = 75,000 X 0.00015 = 11.25 or 11
present requirement = 75,000 X 0.0015 = 112.5 or 113
future requirement = 81,000 X 0.0015 = 121.5 or 122
village health workers needed in 1990.

Since the computations are simple, it is desirable to project future population using high, medium and low estimates (straight linear projection or cohort survival) to allow for population changes.

b) Service Target Method

The necessary data for the service targets method are:

- population demographics
- standards or norms for health service relative to target group
- staffing patterns or task assignments for various classes of personnel
- health personnel productivity.

Population data are available through the census but should be refined for target catchment areas. The service standard (norms) can be determined by soliciting views of expert providers, or from utilization statistics. Staffing patterns and standards come from staffing studies or task analysis studies. Health personnel productivity is discussed elsewhere.

Formula for estimating appropriate health personnel required is:

$$Mrt = \frac{V \times P \times a}{W}$$

where:

Mrt = personnel requirements for an occupational category in year t;
V = average number of specific services per person per year per condition, bases on need;
P = population, current or projected;
a = standard for personnel staffing, or proportion of service provided by a health occupation
W = standard productivity of personnel category (e.g., number of visits per year, average workload of average practitioner).

Example:

- Assume a target population of 10,000.
- The service target is 48 vaccinations per 100 target persons (0.48) per year.
- Assume that the average village health worker will provide an average of 2.125 vaccinations per day, and that
- the average village health worker works four days a week, 48 weeks in a year, or a total of 192 days a year in direct service provision.

$$\frac{10,000 \times 0.48}{192 \times 2.125} = \frac{4800}{408} = 11.76$$

This approach allows the analyst to focus on the provision of services. The efficient and effective delivery is the central concern. The attempt to build an understanding of relationships among the factors in this approach is important. The analyst consequently can compare the hypothetical utilization of various personnel categories given task analysis, productivity and labor costs.

The data, however, will not be readily available in all cases and some form of task analysis should be made part of a health sector analysis. Estimates of productivity can be gathered from providers on a random sample basis. Providers can be asked to give retrospective estimates of services provided over a short span of time. These data can be averaged and a range of services can be constructed.

c) Economic (Effective) Demand (Budgeted Vacancies Method):

This method utilizes the financial resources available to support health personnel. Payment can come from the patient, commercial or social insurance, government agencies, or other third parties. The availability of the funds to purchase services, or underwrite the services, is the key factor in this approach.

Data requirements are:

- Current number of filled and budgeted (but vacant) positions for each of the selected positions
- Anticipated employment for the target year(s). This can include alternatives for various personnel categories.
- Hours worked, either part time or full time. Supportive data includes:
- task analysis of job functions
- wage ranges for job categories
- length of time during which jobs are vacant
- facility characteristics
- number of beds and inpatient days
- expansion plans for hospitals and other facilities.

The formula for estimating health personnel:

Mrp = present personnel requirements
Mrt = future personnel requirements

$$Mrp = Eby + Vby$$

$$Mrt = Eby + Art$$

where: Eby = present or base year employment by category
Vby = present or base year vacancies by category
Art = additional personnel needed during target year
Vby + Art = present complement of positions plus personnel needed as a result of vacancies and expansion

It is assumed that the vacancies represent budgeted positions for which funds are available. It requires an accurate presentation of budgets for health related personnel and the assumptions about future personnel. (Budgeted vacancies, however, often do not exist in budgets.) The focus may be on the increase of positions due to expansion, or "expected" increases in personnel budgets.

This method allows the planner to compare personnel increases by categories. It is based upon the comparative salary rates of personnel needed in the target year. It is important to consider which categories of personnel can perform specific task functions, and the cost comparisons for adding personnel. The most important quantitative and qualitative changes may come from increasing technician and professional time, and relying on them to perform more supervision and guidance/training.

Data for the budgeted vacancy approach come from secondary data sources, especially plans associated with Ministry of Health budgets for training institutions. Original surveys may be necessary to determine some of the data regarding vacancies and expansion. The data sources for such surveys are the employers, of one example would be the providers of primary health care services.

d) Community Participation

It is essential that needs and various perspectives of the community be given serious attention in any planning effort. Two issues are important as part of a needs analysis. The first issue is, what are the perceived community needs for health care and, what forms do the resolution of the need take. (The normative

group process described in the Appendix provides a useful method to elicit problems and needs.) Field surveys performed as a part of a health sector assessment can elicit persoectives on needs and preferred solutions from various community members.

A second issue relates to selecting appropriate persons or groups to undertake such an analysis. An alternative to the outside professional performing surveys and imposing his view on the health needs of the community is to provide the community with control over their own health resources planning. This decentralized approach to health policy should be considered a viable alternative to health policy planning and implementation.

Supply Projection Operations

The second major set of operations and sub-operations the planner will utilize in deriving the health personnel plan concerns supply projection. The simplest representation of the equation is as follows:

Future Supply = Current Supply + Inflow - Outflow

Solving the above equation, however, is not as simple as it seems. Kriesberg, Wu, et.al. (1976) have adapted John Glasgow's projection techniques. Their work is presented below under the formula and data elements sections.

To assemble the various data elements, the planner seeks to project the supply of persons qualified and able to work in various categories at some future time. As a point of departure for this work, estimates should be made of the probable number of persons actually working in the health sector given present and future demand. Estimates should also be made as to the extent to which supply may be increased without establishing new training institutions. It is recommended that the planner derive a three to five year projection.

The supply of health personnel in a future period equals the current supply plus new workers with an added during the period (inflow) minus workers lost during the period (outflow). The simple equation becomes complex as the various factors which conceivably determine inflow and outflow are added to the formula.

$$\underset{(E + UE)_{N+1}}{\text{Future Supply}} = \underset{(E + UE)_{N}}{\text{Current Supply}} + \underset{(TP + OC + NLF + I)_{N \quad N+1}}{\text{Inflow}} - \underset{(D + R + T + OL)_{N \quad N+1}}{\text{Outflow}}$$

where: Current Supply: E = employed workers
UE = unemployed workers seeking work in occupation

Entrants or Inflow:
TP = entrants from training & educational programs
OC = entrants from other occupations
NLF = entrants from those not in labor force, qualified but not employed in the base year.

Losses or Outflow:
I = immigrants entering the occupation
D = deaths
T = transfers to other occupations
OL = other losses: emigrants to other regions.

(N = the base year, and N+1 = base year plus one year.)

Basic data required to complete the formula are:

- Baseline data concerning health personnel supply; they are defined as both the employed and unemployed seeking work in a specific health profession.
- Inflow data concerning the addition of new graduates, immigration, mobility due to occupatioan and geographical reasons, and labor force reentry by formerly inactive workers.
- Outflow data relative to worker losses through death, retirements, occupational and geographic transfers.

The supply projection process assumes that the planner has been able to collect the necessary baseline data.

Inflow data can be secured from theprojected outputs of various educational and training institutions in the country as well as developing projections with respect to entrants from other occupations, and those not in the labor force. Methods for doing this follow.

Outflow data from immigration, death, transfers, are gathered through various methods discussed below.

Inflow to Future Supply: The basic factors to be considered in assessing the inflow of health workers as part of the future supply equation are:

1) What is the supply of available qualified a-plicants within the educational system? This is reasonably easy to ascertain given access to school and training institutions' application statistics.

2) What is the capacity of the educational institutions to train and produce qualified health workers? Planners should consider not only the number graduated from each training institution in the country but the number and location of training facilities as well. Expanded or revised capacity through new construction of training facilities and upgrading technology should also be considered in this estimation.

3) How can the present student dropout rates be improved? Is anything planned to increase graduation rates?

4) What funds are available for increasing training? What changes are anticipated which might increase capacity or lower operating costs so that more students might avail themselves of specific training?

5) What is the availability of teaching personnel? Will there be enough professors and teachers to train workers if capacity should otherwise become available?

Once the above factors have been considered and valid answers for each question obtained, the planner can establish a current supply estimate. Then, in turn, he or she should develop the number of entrants from all sources (per worker category) for the projection period, aggregate base supply with estimates of future entrants, and subsequently subtract the occupational losses for the period.

Training institution output is relatively straightforward. From the data gathered on the various types of health workers trained by recognized institutions, dropouts are subtracted from each "cohort" of currently enrolled students. This will yield the number of graduates. These same dropout rates are then applied to anticipated student intake in future years for the resulting projected graduate level. (It may be necessary to adjust these projections for special circumstances, e.g., changes in sex ratio of incoming students, increases in repeater students, delayed graduations, and worsening economic trends which may force previously non-interested students into relatively "safe" health occupations.)

At this point the planner has derived the number of workers by type currently available and the number expected during the period of projection. These gross estimates must take into account attrition or loss rates to derive net projected supply.

Outflow of Future Supply: Outflow from future supply may happen for any number of reasons: death, retirement, transfer from the occupation in question, or emigration. The two primary methods for quantifying outflow are the life table and cohort method.

1) Life Table Method. Projecting future supply requires estimating outflows from the stock of active workers. Unfortunately, most developing countries do not have reliable life tables. Proxy tables from developed nations or from the United Nations may, however, be used. These tables provide the approximate losses over various time periods. These tables should distinguish between women and men. The problems associated with the use of life tables include overlooking attrition due to transfers, changes in occupation, migration and part time employment. Adopting the life table from an industrialized nation can lead to substantial variances in reliability. The application of a nation's vital statistics may, for example, misrepresent the health workers by selected categories.

2) Cohort Method. This procedure quantifies the number of various health workers licensed or trained in each decade)though shorter or linger time periods may be used) with the relative numbers discovered to be currently active. This method presumes accurate information on the type of worker, status, and age.

Given this data, lost per decade as a function of time can be derived. In turn, these observed loss ratios are factored to each "cohort" or group of workers active in the base year to establish the number likely to be active one or two decades in the future. This process assumes that the baseline data are reliable and that there will be no fundamental changes in the basic loss rate over the two decade projection record. Despite these two limitations, the cohort method is extremely attractive methodologically since it includes various reasons for outflow of supply (emigration, job change, retirement, and death) whereas the life table method considers only death.

3) Death Rate Determinations. Actual death rates are often calculable given accurate mortality statistics from professional associations and licensure boards. When available, these are excellent sources for verifying statistical estimations.

Another alternative is use of a general life table for the population as a whole. The planner must alter it, however, to whatever correction seems most appropriate for what is known about the specific occupational category. In time, profession-specific life tables may be derived. This will greatly simplify the estimating of outflow due to death.

4) Retirement Loss Calculations. Retirement in its various forms is often the highest source of loss from any given health occupation. Calculating this loss is particularly difficult because each country and each profession have different retirement ages. Indeed, some physicians in private practice never really retire as such, but reduce their practice to minimum levels as time, energy, financial and service needs dictate. These factors make retirement loss calculation extremely difficult.

In most cases, determination of retirement loss is best accomplished through cohort analysis. The advantages here are apparent. Retirement or loss surveys in certain occupations may also be used but are costly and time consuming.

Temporary retirement, due to marriage and child rearing, is a significant factor to consider in health personnel planning. The Johns Hopkins University study in Turkey, for example, achieved a bimodal curve when plotting the percentage of active nurses in each cohort of graduates against the year of graduation. This curve suggested a considerable return to the nursing profession after the childrearing years. Such information is of inestimable value in anticipating future losses.

5) Migration Loses. Migration losses can constitute a major source of loss in projecting some personnel categories. The planner faces a two-fold problem at this juncture: losses due to migration for training and those due to emigration. Practically, given the long training periods for some occupations, these two losses may appear as one.

Sources for migration information are standard and are discussed elsewhere in this report. Factoring this information into outflow calculations may be done with a view to potential government interventions in the public policies governing migration and emigration. Should migration policies change in the future, net changes calculated upon past trends may not be reliable nor useful for planning purposes.

6) Approximations. Given the absence of accurate data necessary to make the foregoing calculations, viable approximations may need to be made. The literature suggests that most personnel categories in developing nations are experiencing rapid growth rates. Assuming migration and transfers are not a significant problem, annual loss rates for male health professions may be approximated at 1% to 1.5% while predominantly female occupations appear to have loss rates in the neighborhood of 2% to 2.5% per year. These approximations should take into account the apparent average age of the various categories.

Allocation/Utilization of Health Personnel

While not "operations" in the narrowest sense of this model, there are several allocation and utilization aspects of health personnel planning which warrant attention. These include planning perspective discussion of such topics as selection and recruitment of personnel, training and medical education, research, task analysis and assignments, licensure and accreditation, and rural service incentives. These issues might be placed in any of several locations in this manual; for instance, task analyses might more properly be considered an instrument for validating, or at least clarifying, personnel data inputs; or, rural service incentives might more appropriately be considered under a section involving policy options in the outputs chapter. Nonetheless, this manual addresses these issues at this point so that the planner might keep these ancillary but critical issues in focus as the planning/assessment process develops.

The issues of selection and recruitment interface in at least three ways:

A) Defining Recruitment Selection Requirements. The planner may wish to review recruitment and selection criteria as they apply to the various health personnel categories. Background, birthplace, willingness to work and live in rural areas may be as important as educational attainment in some cases. Linking seldction criteria to job related tests or real work situations rather than education is also useful. The focus on the assessment of competency, rather than education , is recommended through there may be significant restrictions involved in utilizing this approach.

B) Community Acceptability as an Important Selection Criterion. The literature shows a direct and high correlation between recruitment/selection from a certain locality and subsequent success as a health care provider in that area. Ethnic and regional background, and language/dialects are important factors. They are indicators of potential acceptance by the community in this demand for services. For certain levels of health providers, success depends upon the extent to which the provider is close to the population in culture, lifestyle, and language. The planner can improve health personnel retention by recognizing community acceptability as a factor in selection and recruitment. Training programs which concentrate only on educational factors and not give sufficient attention

personal attributes, may fail to generate an adequate level of personnel supply. These issues are more valid for auxiliary and technician levels than professional.

C) Continuing Recruitment Efforts. Those who view recruitment as an ongoing process of improvement and refinement aimed at reducing potential drop-out and mismatch problems are better able to predict their production rates than those whose programs are ad hoc, and for which poorly focused effort is used. In turn, as the programs themselves are in a better position to make predictions, so can the planner increase his or her predictive capacity. As the ability to make more accurate predictions increases, the health personnel plan becomes more realistic, one in which key decision makers can have greater confidence.

Training and medical education offers several issues for the manpower planner:

1) Determining the duration of Training Education. Different categories of health personnel are trained for different lengths of time. Within these differences, allowances are made for differing traditions of medical education. The British tradition for physician training involves a series of three distinct periods over five years. The French tradition replicates curriculum and examinations as taught in France over a six year period and allows physicians to practice in any French speaking territory.

In the United States, however, overall education in the basic sciences (prior to or in the first years of medical school) is an integral part of physician training, internship and residencies.

As regards auxiliaries, training duration is a function of both cost and time. As expense and time increases, the viability of training certain types of auxiliaries (rather than preparing technicians for instance) decreases. Fendall (1972) suggests that convenient rules of thumb are that auxiliary training should not exceed three years nor one-third the cost of training the professional or technician counterpart. The approximate duration of training/education programs should be known by the planner so that subsequent supply projections may be made effectively.

2) Theory and Practice in Training. The literature varies on the proper "mix" relative to theory and practice for the various education programs in medicine and related health fields. Ratios vary from 1:1 to 2:1 from theory to practice. Simply stated, students usually learn better by doing; hence, practical training reinforces theoretical education. Determining this mix for each of the programs under scrutiny allows the health personnel planner to gauge the relative efficacy of the training and the potential for retraining/upgrading necessary for certain categories in the future.

3) Training Facilities. The location of training in the field allows on-site introduction to actual work environments. This presumably upgrades the quality of training given in appropriate procedure and practice. The location of facilities often links the staffing, supplying, and financing of medical education/training. This suggests the need to ascertain the nature and location of the training facility as a way to examine the development of trainees. Expansion recommendations are a function of present status and therefore of interest to the planner.

Overseas locations are significant in that cost rise geometrically and the opportunity for out-migration is increased. In most cases, only highly specialized professionals yield effective cost-benefit results from overseas training.

4) Continuing Education and Occupational Growth. Much of the health education and training is conducted through in-service or continuing education and may represent a significant portion of the training conducted. Such training can upgrade auxiliaries to technicians, or village aides to auxiliaries. It may tend to misrepresent the planner's stock and supply figures. Team approaches may register as dislocations in the planner's projections since continual education

and competency upgrading may occur within the team's efforts. The planner should attempt to understand how each personnel category provides for continuing education and how it relates to task assignments.

5) Impediments to Training. The two largest obstacles to providing education in the medical and related health fields as well as training are an acute shortage of faculty and lack of an adequate supply of books and materials on a variety of medical/health training topics. The planner should understand the extent to which these problems affect the production of training/education services, and ultimately the production of trained personnel in various categories.

This entails ascertaining the relative importance of using expatirate faculty, the effect of low salary scales, the absense of academic tenure (which prohibits reasonable job security) and other factors impeding adequate training. Many impediments have little or nothing to do with faculty and textbooks directly. A case in point is an unpublished study by the Indian Ministry of Health which suggested that currency controls imposed by the government were inhibiting the purchase of equipment which in turn prevented the expansion of medical training.

Once such impediments are understood, perspective can be given to the planner's statistical information which creates an increased ability to accurately make predictions.

Licensure and Accreditation

Many types of health workers are licensed by various organizations in developing nations. Almost all health workers are required to be licensed, accredited, or certified in some way. Such licensing generally is designed to protect health services users by ensuring that health workers are appropriately qualified. However, many professional associations and organizations which accredit various occupations can also be viewed as guilds which reduce competition and therefore increase the price of their services in the health marketplace. Whatever the case, licensure is a significant aspect of health personnel planning.

The health manpower planner should become familiar with the licensing, accrediting, and certificating procedures of the various occupational groupings under study. This permits a greater understanding of the policy options available to decision makers. In many cases, limited or otherwise circumscribed licensing may serve to protect the public while not inhibiting greater numbers of professionals from practicing their skills. This is especially true in the area of paraprofessional or auxiliary workers.

The World Health Organization's regional office for the Americas, known as the Pan American Health Organization (PAHO), has derived an outline of task assignments by types of personnel. This outline is useful in developing a framework for the analysis of work tasks and activities. Others are also available in the literature. Whether they have application in any individual country, especially outside Latin America, should be taken into consideration.

Understanding motivation or incentives for service in rural regions is an important part of the health manpower planner's effort. While difficult to assess, motivation may generally be seen as the end result of what determines behavior; incentives, in turn, may be what helps motivate someone. The creation of incentives to motivate various types of workers to serve in rural or remote locations is a significant part of the policy options the health personnel planner will provide to decision makers.

The following are several categories of incentives which the planner may wish to investigate individually for each of the occupational groupings studied in the personnel plan:

- monetary
- non-monetary, tangible benefits: housing vehicle, food
- dedication and service
- intellectual satisfaction
- advancement and/or rotation
- security and quality working conditions: laboratories, facilities.
- recognition and prestige

Within these categories there are several options which the planner may wish to promote in a given shortage situation. Country-specificity and individual situations prevent a detailed analysis of these options.

The following have been utilized in the past with varying degrees of success to promote rural service:

- family allowances
- housing provision
- salary differential supplements
- placement on multi-disciplinary teams
- reduction interest rates on loans.
- scholarships for university study
- national payment of insurance/bonding costs
- subsidized professional conference participation
- increased access to publication in government journals.

APPENDIX C

SAMPLING PROCEDURES & TRAINING INSTITUTION SURVEY

Sampling Procedures

These procedures will differ according to the professional planner's training. Generally, good social science practice will indicate that survey return rates should not be less than 80% and preferably 85% or better. Surveying graduating classes in five year intervals, for instance, can facilitate a useful 20% sample; excellent distribution according to age enables researchers to locate missing persons through extended friendship groups that are generally obtained in training or university class situations. In any case, attention to sampling procedures should be done in advance of any survey and sufficiently worked out so as to make the resulting information reliable and valid.

Some general procedures that have been found to be useful in this regard are all that can be given in this brief manual; the purpose is not to attempt to instruct professionals on the intricacies of sophisticated survey research, but rather to encourage a more uniform approach by providing guidelines and checklists. Some of these procedures include the following:

1) Personal Visits: These are especially useful to help provide for a more personalized data collection system which usually results in the generation of additional places from which data to complete files can be obtained. Responses to mailed questionnaires are rarely higher than personal visits.

2) Short Forms: Experience in survey research has shown that shorter rather than longer forms are more useful and productive in gathering data. Again, it is never so important to gather 100 items poorly as 25 items very well.

3) Prompt Coding: Long delays between collection of data and its coding lead invariably to analysis problems. Also, a basic alphabetical reference system for data should be developed allowing the retrieval of items which may be lost in processing.

4) Prior Publicity: Advance notice (conditioning) that a survey or census is going to be undertaken will greatly facilitate the effort. Once again, to be included in the survey is to be "important"; likewise, to have the surveyer come to you after prior publicity is added reinforcement to this process.

5) Close Supervision of Field Work: This aspect cannot be stressed enough. Anyone who has conducted survey research will attest to the ability of any field staff to generate data which is barely credible at best and downright false at worse. Closely supervising the census or survey takers is required in order to obtain useful data.

6) Particular Problems: Often in the course of the pre-test and actual administration of a survey research instrument (census or survey) many operational problems will develop.

The planner needs to be especially sensitive to these and to the impact they will have on the overall design and execution of the project. For instance, physicians may think that data collected on the amount of their work will be used in an adverse way. If they are asked to list work hours and kinds of activities, they often suspect that this information will come back to cause

them difficulties in connection with taxes. Reassurance and protection of information are necessary in this environment. Likewise, the researcher must be wary of inflation and deflation of data. This happens for prestige (iflating work) or tax purposes (deflating it) as well as for many other reasons. Attention to very particular problems of respondents will allow for a closer understanding of the results finally achieved.

Survey of Training Institutions

In addition to specifically conducting a census of manpower occupations, the personnel planning process may require a detailed survey of various training institutions participating in the development of personnel for the health fields. Many feel this survey is essential; in any case, identification of institutions, tabulation of past production, and determination of capacity for future increases are highly necessary. Whether the survey is more or less of a formal nature is essential only to the planner. What is important is that reliable, valid, useful data be generated.

Variables which should be gathered in this survey include the following:

- Current enrollment by year of study, by school, and by sex.
- Applicants for admission by program by school including some estimation of the number actually qualified for admission.
- Drop-out rate by program by school. Also called student losses, attrition, wastage, etc.
- Student repetition rate by program and school over last ten years (i.e., number of students repeating the first, second, etc., year of studies).
- Teaching personnel by number of faculty positions budgeted as converted to full time equivalents.
- Financial resources by program by school.
- Anticipated future intake by each school program (based upon previous five years and taking into account planned changes in enrollments).
- Foreign graduates and foreign degree validations by program and school.
- Adequacy of teaching facilities and physical plant per school (laboratories, dormitories, etc.) for planned enrollments plus any planned expansions.
- Potential curricula changes by program and school which might affect input or output of students.
- Projection of new graduates by program and school for next five or so years.

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6. Health Facilities Planning References